C A J A N U S

Newsletter of

THE CARIBBEAN FOOD AND NUTRITION INSTITUTE

Mona P. O. Box 140,

Kingston 7, Jamaica

VOLUME II 1969

CONTENTS

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THE CARIBBEAN FOOD AND NUTRITION INSTITUTE

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EDITOR'S ANNOUNCEMENTS

Completed 'Cajanus' evaluation questionnaires continue to arrive in ones and twos, and we therefore defer analysis and publication of the results till a future issue, thanking those who have replied. The evaluation questionnaire was inserted in Cajanus No.5, with an addressed envelope, and to facilitate those who have not yet replied but may have passed on to others their copy of that number, or mislaid the questionnaire, we include a second copy questionnaire. That we have received 40 replies to date is encouraging, and they contain most helpful suggestions. However we would like to develop 'Cajanus' on the basis of, say, a hundred or more replies, and so we again urge those of our readers who have not yet replied, to help us to make this newsletter approximate closer to what they would like it to be.

Regarding our Competition for Proverbs Related to Nutrition, (see Cajanus No. 5, October 1968, page 89) we have received some rather good entries, but we would like to give more readers the opportunity to compete, and so we are postponing the last date for entries to March 15, 1969; results to be published in the April issue of 'Cajanus'. The prize is £5 (24 E.C.$) for the best proverb which can be used in nutrition teaching, and several proverbs can be submitted by each entrant; in each case with a statement of what nutrition education point they can be used to illustrate.

NUTRITION AND POPULATION *

or

FERTILITY - OF EARTH AND OF MAN

by
Cicely D. Williams

First I would like to record my deep appreciation to the American Medical Association and the Nutrition Foundation Incorporated for their great generosity in selecting me for the Joseph Goldberger Award in Clinical Nutrition.

There are many reasons why I have cause to be especially grateful. The first thing is that most of my life has been spent in developing countries far away from modern research centres and the lime light of scientific advances. Secondly, and because of this experience, the clinical aspects of nutrition have always seemed to me of supreme importance. Thirdly the work of Joseph Goldberger, even from my pre-clinical days at Oxford has always seemed to me of the greatest value and of a beautiful simplicity. In 1935, the few who were interested in my observations on Kwashiorkor, were busy telling me that these cases were in fact "Infantile Pellagra." This was before the days of serum protein estimation and of easy international exchanges. I took it upon myself to visit New Orleans. Owing to the kindness of Dr. C. C. Brass, Dr. Roy Turner and Dr. Robert Strong I was able to examine records and cases at Charity Hospital and to confirm that pellagra and Kwashiorkor

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* Footnote: The Goldberger Address delivered to the A.M.A. Convention Atlantic City, 21 June 1967 by Cicely D. Williams, C.M.G., F.R.C.P. Dr. Williams, a Jamaican doctor, was the author of the first descriptions (in the early 1930's) of Kwashiorkor.

were not identical. As with other nutritional diseases, there is nothing to prevent mixed cases from occurring.

"Nutrition and population" have been chosen as a subject, because, next to law and order, they are the most urgent problems in the world today. Their relative values dominate the policies in health and medical care.

Questions of fruitfulness and fertility, of the earth and of the people living in it, are exercising the minds of nations, of communities, of families and of individuals. They concern curative and preventive medicine. They concern the material and the mental well being, and they have a deep emotional content.

But it is only within the last twenty years that these subjects have assumed a critical importance. Why are they so urgent? Why in the last twenty years? and why so much in the economically less developed areas? These are the questions I would like to discuss.

Nutrition Only in recent years has there been much scientific study of nutrition yet there is still some uncertainty in the meaning of words. By "malnutrition" are we referring to defects in the food intake? or to defects in the physique of the patient? Some patients appear malnourished owing to attacks of diarrhoea, of dyspepsia, worms, tuberculosis or skin conditions. Some of these have little to do with the nutritional components of the food.

A great deal of research has gone into food structure, production and conservation. Surveys have been carried out to reveal the types and to some extent the prevalence of malnutrition. These have been most

valuable in drawing attention to the whole subject. But little has yet been done to ascertain the causes, and we can do little in prevention until we discover the causes.

Health means physical, mental and social well being. The diagnosis must include the physical, mental and social causative factors.

Diagnosis must be clinical, laboratory and statistical. This must include vital and health statistics so as to define the types and incidence of diseases and the effectiveness of existing services. Lastly diagnosis must be cultural, to include traditional concepts and attitudes as well as literacy and educational status.

We need long term observations as well as short term surveys. Only in this way can we learn the multifarious causes, physical, mental and social that lead to malnutrition and the resources with which malnutrition can be combated.

There has been a wide spread impression that most malnutrition was due to lack of food. This may be true after an emergency or disaster whether man-made or of nature. But in my experience this is by no means common. Unless we do long term observations from established and acceptable clinics, dispensaries and hospitals we cannot be sure either of the existence of malnutrition or of its causes.

Statistics Often statistics get too little emphasis from clinical and from public health practitioners. Epidemiologists do not often appreciate how figures can be used. For example, in one town in Africa there was an impressive and apparently popular health centre. On examining the

register we found that 80% of the patients were male. Ages were not recorded but it was soon observed that less than 2% of these patients were under 10 years of age. In fact the medical services were concentrated on the adult males, and neglecting the mothers and children. This was in spite of the fact that over 50% of the total mortality was in children under five years.

In another place we found a much vaunted "MCH Centre". But there were 509 new antenatals and only 115 new infants in the previous year. Obviously the work was unbalanced.

In yet another place they reported a very moderate maternal mortality. But whereas the death rates of males and females were almost identical before 14 and after 40, the female death rate during the child-bearing years was nearly double that of the male. The deduction was obvious.

Without statistics it is not possible to make either diagnosis or policies. It is regrettable that neither the doctors nor the sociologists have made sufficient use of them. It was my former chief, Professor John Ryle who said "Ethical values cannot be measured ------ but that there is a relationship between the revelations of vital statistics and human responsibility in a modern society we can scarcely dispute" (Changing Disciplines" p.119).

Tropical Medicine The study and activities of Tropical Medicine have achieved much, especially in the control of communicable diseases. Parasites and their vectors have received an enormous amount of attention. But because of large numbers of patients with multiple disorders, and because

of the effects of poor personal and domestic hygiene it has been difficult to assess the relative importance of these "tropical diseases." Experts on malaria, leprosy or cholera are adept at dealing with their own specialt but they are often unable to assess non-communicable diseases, nor can they always appreciate priorities.

Vector control, mass immunisations and mass treatments are all begini ing to show anomolous or disappointing results.

These methods are of limited value. It is only when we determine to reach the unreachable, and establish better standards of personal, domestic and community hygiene and behaviour that we will succeed in preventing the preventable.

Above all it must be recongised that to protect a man from malaria, to immunise him against smallpox, cholera or tuberculosis, or to treat his yaws rapidly and possibly effectively, none of these things automatically insure that he thereby has a higher standard of education, or of living or of responsibility. There is indeed some risk that these measures may encourage a degree of dependence.

Tropical Medicine in the past has ignored the need for special attention to children.

Population The world population is increasing rapidly and especially since World War II. What has caused this fantastic increase? Why has it accelerated sharply in the last twenty years?

Apart from the ordinary human, social and physiological causes there are the following factors:

War and Civil disorder increase deaths and decrease births. The establishment of law and order will inevitably lead to population increase.

Concentration on mass disease control and mass feeding has undoubtedly saved many lives. The result is a population increasing in quantity but not in quality. The World Health Organization has been spending 32% of its operational budget on Malaria control and less than 4% on Maternal and Child Health. It is obvious that the most excessive "population explosion" is in the developing countries where these disease control programmes have been concentrated.

Social Assistance has in some areas encouraged large families and unemployment. This is apparently happening in Mauritius. (Titmuss, R. M. & Abel-Smith B. 1960).

If countries have an effective system of child care there is a decreasing birth rate, apart from campaigns for birth control. People develop their own, often bungling methods of controlling procreation, unless they are given adequate guidance in family planning.

India, where only about 15% of the population has the advantage of MCH Services, has a vast population problem. A great deal of money, personnel and effort has been spent on birth control programmes in the last 10 years but so far with little effect. This is in contrast to Singapore where MCH Services have been comparatively well organised and reach about 80% of mothers and children, the birth rate soared to 50 after liberation from Japanese occupation. But it is now less than 30.

The Plan The developing countries greatly need more concentrated and enlightened attention to Maternal and Child Health. This should be the channel through which the families and those most in need should receive medical care, nutrition, health education, mental health and family planning advice and supplies. MCH Services can also do much to improve the reliability of statistics.

Herewith is a chart (p. 10). By this medicine is no longer divided between preventive and curative measures, but the major distinction is between the Mass and the Individual approach.

Mass medicine is mainly preventive and only rarely curative. But for personal or individual medicine, each client must have as much treatment as he needs and as much prevention (be it immunisation, health education or environmental sanitation) as he can take.

Good diagnosis is essential both to treatment and to prevention.

Training of personnel needs very considerable modifications to adapt to this concept of health care. The health staff have an immense advantage. They can provide treatment for obvious physical disorders (whether it is the scabies in the child or the cockroaches in the kitchen) and this is the best possible introduction to health education of every description.

Conclusion

Developing countries in particular need a unified approach to health (physical, mental and social) care, through a balanced health programme.

An Institute of Maternal & Child Health at international level would be of enormous value in helping to focus attention on the most vulnerable

Map of Health Care

Mass Medicine

Preventive	Diagnostic	Curative
Environmental Hygiene water supply refuse disposal pest control	Clinical	Anti Yaws Campaign
Food Hygiene	Laboratory	? deworming
Occupational Hygiene	Statistical vital health surveys census economic	? anti-schistosomiasis
Mass Immunisations		? etc
Health Education of the Public	Cultural traditional educational	
Housing		
Transport		
Recreation		

Individual Medicine

Hospitals	*Maternal and Child Health*	*Paediatrics* - Clinical and social
Health Centres Clinics		*Obstetrics* - Clinical and social
Home Visiting		Nutrition
School Health		Health Education
		Mental Health
		Immunisations
		Family Planning
		Statistics

N.B. In the case of mothers and children, preventive, curative and diagnostic care are all included.

groups, on the desperate problems of nutrition and population, and in creating a comprehensive and comprehending attitute towards their manifold needs. This centre could serve in educating all manner of doctors, nurses and midwives, and in helping administrators, educationists and social workers to appreciate patterns and the potential of health care.

Hospitals must work through health centres and domicilliary programmes, using these as extensions of their activities for treatment, advice and for continuing supervision and support. The distinction between curative and preventive medicine as *applied to individuals* must be abolished. In treating a minor disorder we are preventing a major catastrophe.

By comprehensive and efficient Maternal and Child Health Service we can minimise the wretchedness of unwanted and neglected babies, and we can practically abolish the malnutrition due to misuse of food. A policy devoted to this would go a long way towards solving two of the major problems in the world today. It could be done cheaply and it could be done constructively.

Services must be comprehensive and they must provide continuity. We need to pay more attention to organisation and to training of personnel.

NUTRITION NEWS AND OPINION FROM THE CARIBBEAN

PROFESSOR ROY MARSHALL TO BE NEXT VICE-CHANCELLOR - from UWI Newsletter, September 23, 1968.

As announced to press and radio last week the Council of the University of the West Indies has appointed Professor O. Roy Marshall, Dean of the Faculty of Law of the University of Sheffield to succeed Sir Philip Sherlock as Vice-Chancellor of the University of the West Indies.

Sir Philip goes on pre-retirement leave on April 1, 1969, and it is hoped that Professor Marshall will be able to take up his appointment on that date.

Professor Marshall is a Barbadian who won the Barbados Scholarship in 1938 and obtained First Class Honours in the Cambridge Law Tripos. He has been Head of the Department of Law at the University of Sheffield since 1956.

1969 - AGRICULTURAL YEAR FOR TRINIDAD AND TOBAGO - from the Trinidad Centre of CFNI.

The first year (1969) of the third Five Year Plan (1969-73) has been declared by the Government of Trinidad and Tobago as the Year of Agriculture and a high level Committee under the chairmanship of the Minister of Agriculture, Mr. Lionel M. Robinson, has been set up to plan the details of the programme for the year. The proposals for Agriculture Year 1969 were released on 30 December, 1968, by Mr. Robinson. It was indicated by him that there will be a series of Press-Radio-TV programmes with emphasis placed on the following:

1. Improvement of production and productivity of crops with market potential.

2. The importance of agriculture to the national economy - the farmer's role, the functions of processors and the consumer.

3. The role of the several divisions of the Ministry, including Fisheries, Forestry, Cooperatives, Agricultural Development Bank.

4. The role of the Faculty of Agriculture, UWI.

5. The role of the private sector.

6. Market information to be provided daily by the Marketing Division.

7. Careers in agriculture - (may be a joint programme of the Ministry of Agriculture and the University of the West Indies.)

8. Nutritional aspects of local crops and demonstrations of new and better ways of producing them.

9. Also proposed are a number of field excursions and exhibitions which include:-

i) visits to the stations of the Ministry of Agriculture;

ii) conducted tours of the University of the West Indies, sugar and fertiliser companies, canning factories and farms of successful private farmers;

iii) visits to several crown land projects;

iv) exhibitions of agricultural produce, equipment, new cultivation methods in six centres of the country, and national exhibition in Port of Spain;

v) culinary exhibitions jointly with the Ministries of Health and education in the main population centres;

vi) preparation of booklets in the simplest possible language on various crops for distribution to farmers and to schools as teaching material.

Similar proposals have been drafted for the Forestry and Fisheries Divisions.

A similar programme should be mounted to 1970 and 1971 based on evaluation of the 1969 programme. The Faculty of Agriculture, UWI, and the Agricultural Association of Trinidad will also formulate their respective programmes.

OFF-SHORE FISHING IS NOT ENOUGH - EDITORIAL - The Advocate News, Barbados, 22 November, 1968.

Concentration on the study on the fishing needs of the Caribbean and training and development schemes through the United Nations Caribbean Fisheries Development Project continue, with the objective of increasing sources of supply reducing substantial imports from other countries.

At the moment a symposium is in progress in Curacao, dealing with the fishing resources of the Caribbean.

Meanwhile, investigation into fisheries resources of the Caribbean entered a new phase yesterday when a team of experts began consideration of the treatment of fish and other sea products within the territories participating in CARIFTA.

SALTED FISH

Large quantities of salted fish are imported annually by a number of CARIFTA countries. It is felt possible that in considering the treatment of fish and other sea products, consideration will be given to how some of the money can be kept within the region by salting certain fish now readily

available in the Caribbean.

It is also anticipated that the supplementation of fish supplies in the individual territories during the off-season will be discussed. Thus this Technical Advisory Group, will have the job of offering advice to the CARIFTA countries which can change a traditional pattern of fish imports and inspire a development of extremely important economic and nutritive benefit to the Caribbean.

RICE - ON WHICH SO MANY DEPEND - from The Advocate News, Barbados, 14 November, 1968.

Guyana's rice industry provides a livelihood for more people (directly or indirectly) than any other industry in the country. Nearly 250,000 people earn employment through the rice industry and 45,000 families work on rice farms.

Today, Guyana ranks 16th among the rice producers of the world and is the seventh largest producer on the American continent and in the Caribbean area. The industry accounts for six percent of the country's gross national income.

Within the industry itself, only 62 of the 210 private mills at present have modern multi-stage equipment. Government has announced plans to establish easy credit facilities to enable another 60 to 70 mills to install modern equipment. The smaller private mills with capacities of less than 1 ton/hour can profitably continue as single stage mills milling rice for domestic and local consumption.

Central purchasing centres to be erected at a cost of $20 million will have the latest modern facilities for cleaning, drying and storage of paddy. There will be no loss from storage and a saving of $4 million over previous losses from storing rice will be realised.

PROPER PARBOILING

All paddy purchased at the centres will be properly parboiled and the rice produced will therefore be free from odour. Storing the crop as paddy instead of rice will allow the Rice Marketing Board to have the type and quality of rice milled when it is needed.

The farmer will be absolutely free to dispose of his paddy or paddy milled into rice where he pleases. Consumers or traders in Guyana will be able to purchase supplies of rice direct from millers or growers.

Government's seriousness about its plans to reorganise and improve Industry for the farmers can be readily seen in the following provisions:-

$5,500,000 in loans to the R.M.B.
$800,000 in loans to the R.D.C.
$2,547,117 in subsidies to the R.M.B.
$4,536,000 to absorb the past debts and losses of the R.D.C.

In addition, negotiations, with US AID help have been carried out to secure:-

$85,000 in Blue Belle seed for free distribution to farmers;

$13,000 for Management Consultant Specialists to the R.M.B.;
$360,000 for Technical Feasibility Study of a central paddy purchasing plan by specialists; and

Negotiations are in progress for a $20 million loan to the Industry to finance improved storage of the crop.

ONE NATION'S PROGRESS TOWARD FEEDING ITSELF - by Bernard De Verteuil from Foreign Agriculture - a newsletter of the United States Department of Agriculture.

Trinidad and Tobago, is taking great strides towards agricultural self-sufficiency. From an agricultural economy based primarily on growing sugar and tree crops for export, the country has expanded - in the six years since it became independent - into an active producer of meats, dairy products, food crops, fruits, and vegetables for domestic use. And tomorrow promises substantially greater gains.

How did this happen in so short a time? The answer lies in an ambitious farm program that has combined the resources and talents of government and private enterprise.

From 1797, when Trinidad became a British colony, until Independence in 1962, agricultural policy placed special emphasis on growing sugar and tree crops - cocoa, coffee,and citrus - for export to Britain. Much of the Islanders' food was imported on ships calling for the export crops. As a result, Trinidad and Tobago's farming community was unprepared to grow its own food when the country became independent; and when the value of export crops slumped, most owners of small holdings migrated to the cities in search of more remunerative work. The young state was faced with difficult problems; Foreign reserves started to decline; the government budget, which showed a surplus in 1962, was just in balance in 1965; food imports were climbing steadily, from 26.5 million dollars in 1954 to an alltime high of $52.8 million by 1966; and agricultur's contribution to

gross national product was falling - from 17 percent in 1953 to 10 percent in 1965.

GOVERNMENT BEGINS PROGRAM

As a first step toward solving some of these problems, the government looked at its own lands - 571,000 acres, of which 100,000 appeared adequate for agricultural development. With this, plus suitable climate and available labor, the government was encouraged to embark on an agricultural programme based on domestic production and import substitution to reduce food imports and relieve unemployment. Sine three of the major import items - dairy products, meat and meat products, and fruits and vegetables - appeared to hold promise for domestic production, the government decided to concentrate on them. In 1966 imports of dairy products amounted to $10.3 million or 19.6 percent of total food imports; of meat and meat products, $8.3 million or 16 percent; and of fruits and vegetables, $5.9 million or 11.2 percent.

After making this decision, the government initiated a program to provide the preliminary basis for development of these agricultural products. First, a land-capability survey was conducted under the auspices of the University of the West Indies. Private industry, interested in the stability of the economy, helped also. Vital information on yields required for economical dairy farming was obtained from an experimental farm operated by a large oil company. Its experiments proving that the imported dairy cattle

could thrive under tropical conditions encouraged the government to use imported Holsteins in its dairy scheme. The same company in conjunction with the University of the West Indies, operates a field station for vegetable research; data accumulated here are being used as a basis for recommending varieties that can be grown on a field scale.

Next, the government reorganized the extension services and started a crash programme for training extension officers. To provide a system of supervised agricultural credit for small-and medium-sized farms, an Agricultural Development Bank was formed. Subsidies were provided for establishing pastures and for construction of pig pens. The government established a marketing agency to provide farmers with a guaranteed market and minimum wholesale price; This agency also deals in livestock feed, seed, fertilizer, insecticides, and other agricultural supplies in order to control prices for these inputs necessary to farm production.

The problem of marketing the milk produced by farmers was solved by granting pioneer status, with an accompanying tax-free holiday, to a large dairy firm, which agreed to establish milk collection stations in a designated district when milk production there reached 1,000 pounds per day. In addition, the dairy firm agreed to purchase all farmers' milk at fixed prices according to quality.

To guarantee a market for meat, the government also granted pioneer status to a meat packing and processing company. This company now has a processing plant under construction; the plant is scheduled to begin its operations sometime this month.

Small Farm Development

Having established these foundations, the government embarked on a major project to develop about 1,800 small farms on 12,000 acres of its own land. Cost of this project has been placed at $11.4 million, of which $5 million is being financed by a World Bank Loan and the balance by the government, participating farmers, private enterprise, and the Canadian Government.

Farmers are being settled on this land at any one of three stages: Full, partial, or basic development. Under full development, the government provides the infrastructure - water, roads, electricity; clears the land; develops the farm completely; and turns the farm over to the farmer as a going concern stocked with animals or planted with bearing trees. Under partial development, the infrastructure and cleared land are provided, but the farmer carries on from there with his own resources. Under basic development, only the infrastructure is financed by the government; on-farm investments for tobacco farms are financed by the tobacco company and for food-crop farms by the farmers themselves.

Two hundred dairy farms of 20 acres each are scheduled for full development, complete with house and other farm buildings. Each is to have

5 acres planted to elephant grass and about 15 to pangola grass, with fenced pastures. The farms are being stocked with five in-calf grade Holstein cows and 15 heifers, mostly imported. The production goal for each farm is 20 cows and 80,000 pounds of milk per year. Including a settlement allowance, the total cost of a dairy farm is averaging $21,541. From this investment, the farmer's income is estimated at $1,300 the second year and $1,705 annually afterwards. The government is holding the mortgage at 7 percent interest. The farmer has 2 years grace and then must repay the loan in 14 years, a repayment schedule totaling 11.43 percent annually. At full development, the 200 farms are expected to produce an estimated 16 million pounds of milk and enough bull calves and cull cows to produce 450,000 pounds of dressed meat.

Pork Production Goals

The government will also fully develop 70 pig-production farms, which will be turned over to the farmer complete with farrowing, rearing, and fattening quarters; storage facilities; and a farmhouse. Each farm is to be stocked with 12 gilts and one boar, with a production goal of 270 porkers, plus cull sows and boars, for marketing annually. Cost per farm, including the settlement allowance, is $14,200, from which investment the farmer is expected to make $424 the first year and $1,740 from the fourth year onwards. Mortgage and repayment terms are the same as for the dairy farms. At full development, the 70 farms will produce some 2.36 million pounds of pork annually.

Tree-crop farms slated for full development total 150, each comprising 10 acres. Some of the land will come from an existing farm planted to limes, oranges, and grapefruit; and it will be at least 5 years before all the farms come into production. The production goal for each is $1,490 worth of citrus fruit annually after 10 years. Cost per farm is estimated at $3,500, with the government holding the mortgage at 7 percent interest. In this case, the farmer has 5 years grace, after which he must repay the loan in 11 years, a repayment schedule totaling 13.34 percent annually.

Vegetables, food crops

A total of 1,320 vegetable and food-crop farms are to be partially developed, with some 1,200 acres to be settled as 3-acre vegetable farms and about 4,600 as 5-acre farms. Acreage distribution is based on soil topography, rainfall and market potential, and the cropping pattern is determined by the Agricultural Service. Plantings on the food-crop farms include yams, pumpkins, pulses, green corn, and peas and on the vegetable farms tomatoes, cabbage, eggplant, and green vegetables. Including the settling allowance, cost per farm is $2,050. The government is holding the mortgages at the same interest rate as for the other farms. After 2 years grace, the farmer must repay the loan in 4 years. Income from his investment is estimated at $885 in the third year after settlement.

Basic development will cover 80 10-acre tobacco farms. These are to be financed by the local tobacco company, which will supply on-farm materials, barns, etc., and handle all technical supervision. Agreed tobacco prices will enable the company to recover its investment costs,

which vary considerably with the areas under development. Each farm will plant 5 acres of tobacco and 5 of food and vegetable crops annually. Revenue for each tobacco farm is estimated to average $1,940 per year.

Results encouraging so far

Although the entire land project is still in its early stages, the foundation for a successful food production program has been laid, and results so far have been encouraging. Imports of food, which for 12 years prior to 1966 had been rising at the rate of 8.3 percent annually, decreased by 3.6 percent in 1967 - the first decline since 1954. From $8.3 million in 1966, imports of meat and meat products dropped 18 percent to $6.8 million. Imports of dairy products, which for 12 years prior to 1966 increased at the rate of 4.3 percent annually, increased only 1.6 pecent last year. Fruit and vegetable imports during 1967 dropped 6.5 percent from the 1966 level.

The success of the government's agricultural development program has been a motivating force for private farmers. With guaranteed markets and prices, they have jumped on the production bandwagon. Dairy farms and piggeries have sprung up all over the country, taking full advantage of government incentives.

As a result of this enthusiasm Trinidad and Tobago has taken a big stride toward feeding itself. Deliveries of milk, which amounted to 600 pounds per day in 1965, have now reached 25,000 pounds per day and are increasing rapidly. The country is now self-sufficient in fresh pork, whereas imports in 1965 amounted to 1.6 million pounds; when the new

processing plant starts operating, it will also be self-sufficient in ham bacon, sausages, and other pork products. Production of vegetables has also caught up with the consumption. As a result, Trinidad and Tobago is now actively seeking export markets for its surplus production of both pork and vegetables.

CAJANO QUOTE - from Naarden News, September 1968.

We, the consumers, profit from the latest products of human ingenuity. Woollen stockings have given way to nylons: the graphite pencil to the ball-point pen; the galvanized bucket to one of plastic; the handpolished table-top to one covered with plastic veneer; and the radio valve to the transistor. This is the Era of Synthesis. Human ingenuity, it appears, is excellent except where it is applied to the food which we eat; at that point, suspicion enters upon the scene and the words "synthetic" (which means putting together) and "essence" (which means fundamental) are interpreted as "second-rate" and "substitute" respectively.

From AGRIBUSINESS REPORT 4 November 1968.

IT'S FOR REAL.....OR IS IT?

The 10th annual University of Arizona Dairy Science Field Day at Tucson included a "drinking test" to determine if dairymen *could recognize the difference between imitation and real milk. Of 100 persons who participated, only 36 correctly identified the imitation product. Others were either unable to notice any difference or chose the wrong sample.*

A COMMUNITY NUTRITION PROGRAMME IN HAITI *

by

Dr. K. W. King
Research Corporation, New York

When professional nutritionists began to turn their attention to world-wide food problems at the end of World War II, the narrowness of previous nutrition research became suddenly clear. We did not know the magnitude of malnutrition in most of the world. It took years of work and thought to develop techniques for finding out how much malnutrition there was and what kinds of malnutrition were most critical country by country. Then, as knowledge of the kinds and amount of malnutrition began to accumulate, another hard truth stared at us. We did not know how to combat it. Even today we have only limited successful experience with applied nutrition programs. Many more programs have been tried than have been evaluated to see if they are really effective. For example, I know of no thorough documentation showing the ability of school gardens to eliminate malnutrition from an area, yet we continue to start school garden programs.

As a consequence, when we as nutritionists are asked to prepare a practical nutrition program, we often find we are not as ready as we should be.

We are perfectly able to draw on libraries full of nutrition knowledge and the resulting dietetics for people who earn $5,000.00 per year. But

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* A paper presented at the CFNI Conference on Protein Foods for the Caribbean, Georgetown, Guyana, 29 July - 1 August 1968.

when the problem is to tell the mother with $50.00 a year how she can feed her family adequately we are stuck.

Suppose we look at the pertinent aspects of peasant life, for in understanding them there may lie the answers to what it is practical to teach them nutritionally and perhaps even answers to the question of how to go about the teaching. Specifically let us focus attention on the peasant woman on the hypothesis, valid to date at least, that in most of the Caribbean it is she who determines the food her child eats and it is the young child who suffers the most severe malnutrition.

The peasant mother has limited formal schooling, and in many instances is essentially illiterate. What she knows she has learned through conversation in the informal atmosphere of friends and relatives. These characteristics mean that a program based on formal lectures in a classroom atmosphere with supporting reading material is not likely to have much impact. The whole structure of the situation is simply so foreign to their past experiences that effective learning does not take place.

Furthermore, she usually is a member of a socio-economic group in which her daily food budget per person is somewhere between 8 and 20¢ per person. This restriction means that teaching her to give plenty of milk, meat, eggs, and cheese to her children is wasted teaching. She simply cannot afford it. To be sure she may learn quite well that she should do it, but the facts of life says that she cannot, so the education is almost cruel in that what she feels she ought to do is impossible to do.

For many such peasant women family food purchases are restricted to local markets containing little or no processed foods. She can learn that it would be good to use such-and-such a low cost brand of weaning or infant food, but if it is not available in her market this knowledge too is useless.

Cognizance needs to be taken, too, of the fact that in many rural areas cooking and food preparation procedures are extremely simple. Child feeding practices that depend on refrigerations, propane stoves, baking ovens, and even such simple things as colanders and mixers have no relevance to the peasant mother's home situation.

We need to remember that signs of malnutrition like edema, dipigmented hair, the variety of skin lesions, and lethargy are usually not recognized by mothers as anything more serious than phases through which every child goes. This naivety is a facet of her general lack of knowledge that good food alone will prevent or greatly alleviate many of the diseases that are every day experiences for her. At the same time she probably has an unreasonable confidence in miraculous curative powers of inoculation, pills, and even worse the traditional home remedies of her society. All of this means that something dramatic and tangible is needed to convince her to change her traditional feeding practices.

A successful nutrition education program for these women needs to plan for the fact that they are unschooled, poor, remote from commercial food channels, and quite naive regarding the relationship of food to the health of their children.

Factors other than the characteristics of the mothers also serve to set the framework of a successful nutrition program. Among these is the

fact that although there may not be enough food in the rural Caribbean to achieve optimal nourishment of the population there is, with isolated exceptions caused by local crop failures, enough food that fatal malnutrition is not necessary. The fact that there is considerable fatal malnutrition among infants and young children has to mean, then, that these youngsters are not getting their fair share of what food is available. I look at this situation as the heart of what hope there is for significant improvement in overall nutrition of the area through education. The food is there; it is simply being poorly distributed within the family as a result of widespread misconceptions about what the food needs of the young child really are.

Because the fatal malnutrition is for the most part a consequence of maldistribution of food within the family the reasonableness of an educational approach to eradicating fatal malnutrition is evident. But who is to do the teaching? And how is it to be done within the tight budgetary restrictions which most government services have to contend with? These two facts of life form a very real side of the framework within which the education program must be built if the effort is to succeed.

In most of the countries with which we are concerned there simply are not enough professional nutritionists to staff the cadres of field teachers that are needed. This shortage forces consideration of using sub-professional nutrition teachers specifically trained to do the job at hand. Hand-in-hand with this compromise of the ideal situation is the necessity to set up a minimum cost operation.

These things then constitute the background for the extremely effective applied nutrition program which has been developed in recent years by Dr. William Fougere, Director of the Bureau of Nutrition in the Department of Public Health and Welfare in Haiti: appreciation of the qualities of peasant women, acceptance of the limited food supply of rural areas, recognition that fatal malnutrition is almost restricted to the very young child, utilization of sub-professionals as teachers, and insistence on a minimum cost operation.

Dr. Fougere's program is built on two main activities. One was a research program aimed at finding out what least cost combination of universally available rural market foods might provide the ingredients for a home made infant food the use of which would assure a mother that her child would avoid episodes of clinical malnutrition. The second was development of the Mother-craft Center as a technique for teaching rural women how to care for their young children.

Something of the nature of the research leading to the new Haitian food mixtures was discussed earlier in these meetings*. The blends called AK-1000 because of their similarity in taste and preparation to a traditional Haitian dish called AK-100, are composed of 70% cereal and 30% beans. The cereal can be either rice, corn, or sorghum depending on market value. The red, white, and black varieties of the common bean *Phaseolus vulgaris* are interchangeable. The AK-1000 is not a balanced infant food in any sense.

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* See also Cajanus No.3 June 1968 pages 16-22

it is meant to serve as the bulk source of calories, protein, and certain of the B-vitamins and minerals. With it a supplement of fruits and vegetables is absolutely necessary to bolster the intakes of vitamins A and C, some of the B-vitamins, and minerals. So when one teaches the use of AK-1000 one must also teach the simultaneous use of appropriate fruits and vegetables.

With the new knowledge of AK-1000 a rural nutrition education program specifically tailored to Haiti could be designed with real hope of effectiveness. The technique for teaching is essentially that of the Nutritional Rehabilitation Center or as we prefer to call it the Mothercraft Center. The term Mothercraft Center has advantages in clarity. The purpose of such centers is to teach mothers the art of successful child raising with particular emphasis on feeding and sanitation. The feeding and rehabilitation of children that go on are simply in the way of practical demonstration to convince the mothers of the solid merit of the new nutrition knowledge they are being taught. Since the thrust of the center is aimed at education of mothers, the name Mothercraft Center is more descriptive. The more cumbersome title, Nutritional Rehabilitation Center, has the further disadvantage of focusing attention on the child-feeding and therapeutic aspect of the work rather than on maternal education which is the primary objective.

The operation of Mothercraft Centers takes cognizance of the set of human, social, and resource circumstances that opened this discussion. The fact that it has been demonstrated to succeed in eradicating fatal malnutrition from Haitian villages where fatal malnutrition had been endemic for years is proof of its efficacy as an educational venture in preventive medicine.

The Mothercraft Center is sufficiently unorthodox as an educational program that perhaps a little description is in order. An initial series of meetings is held with village leaders to explain what a Mothercraft Center could do for them and to generate community support in the form of providing a physical facility and if possible part of the food needs. This process often takes several months. The girl who will actually supervise the center should preferably be involved at this stage. She is a high school or junior college girl who has had special training consisting of both lectures and field experience in child feeding and care. When the stage is set a survey of all preschool children in the village is made to assess their overall nutritional status. The examinations are simple including % standard weight, a check for nutritional edema, and for overt symptoms of any other deficiencies known to be common in the area. From this survey the 30 most poorly nourished youngsters in the village are selected.

They and their mothers are invited to join the Mothercraft Center program, the requirements being that the child must be sent regularly six days a week and the mother must agree to attend all day one day each week for either a 3- or 4-month period.

At the center each day the supervisor and the 4 or 5 mothers are staying for the day feed and care for the 30 youngsters. The center itself is simply a large home typical of that village. The cooking facilities, though larger than usual, are the same as those common to the homes of that community. Only local market foods are used. Surplus commodities and commercial foods from the cities are completely avoided so that what is taught is all useful to the mothers in their own homes. In Haiti heavy emphasis

is put on AK-1000, one recipe or another of it being served almost daily.

The supervisor receives two primary types of support from the central bureau: a daily food budget per child which is similar to what the mothers of that village have at home (in Haiti this is about 10 cents a day), and a set of menus meeting all of a young child's food needs using exclusively local foods.

All day long the supervisors and the mothers work together preparing the meals and caring for the children, and the supervisor continually turns the conversation to why the foods being used that day have been selected. The children are weighed weekly, and their weights are plotted on an individual growth chart so that the mothers can see their progress back toward normal size. The skill of the supervisor lies in her ability to continually reinforce the learning of the mothers by steering the conversation to matters of child care and feeding. Once a week all of the mothers are gathered together for a general discussion and review of what they are learning.

After 3 or 4 months, depending largely on the nutritional status of the children, the group is discharged and all of the preschool children are surveyed again. Then a new group of 30 mother-child pairs is selected for the Mothercraft Center's next group.

When Dr. Fougere's group first began Mothercraft Center programs, there was no documentation of whether such an activity would cause changes of any significance in the household. So before expanding their program into an extensive one they studied the first village intensively. Village-wide dietary surveys were conducted before the center was opened and after

one and two years of operation. In addition a variety of blood analyses of the preschool child population were made. Parallel studies of a similar nearby village without a center served as control.

The town, Fond Parisien, in one of the semi-desert areas of Haiti had about 3500 people. In the two years of operation about 360 mothers were trained in the center. Whereas 30-40 cases of nutritional edema had been present on any given day before the Mothercraft Center opened, essentially no such cases nor any of marasmus existed after two years of operation. The incidence of third degree malnutrition had been significantly reduced. And with no change in the daily food expenditure of 8 cents per person per day there were sizeable increases in the intake of several key nutrients, among them: a 25% increase in calories, a doubling of animal proteins, and a 30% increase in calcium.

In other countries, the basic appropriateness of the Mothercraft Center to prevent clinical malnutrition seems assured, but modification of two types would be likely to be needed. First food mixtures resembling AK-1000 in intent but not necessarily using the same ingredients would be needed. Second, adaptations of the Mothercraft Center concept may be dictated by local customs, the degree of education of mothers, the availability of nutritionally trained personnel, and the budgetary support available.

With a network of Mothercraft Centers, I am convinced almost any nation can essentially educate clinical malnutrition to extinction among its rural population.

Menu Cycles Using AK-1000 in Mothercraft Centres,

courtesy of
Miss Gladys Dominique, Dietician,
Bureau of Nutrition,
Department of Public Health and Welfare
Republic of Haiti

CYCLE I

Breakfast	*Snack A.M.*	*Lunch*	*Snack P.M.*
AK-1000 with Pumpkin	Grapefruit Juice	AK-1000 Heart of Beef ground with Carrots and Green Beans	Powdered skim milk
Sweet AK-1000 with skim milk	Orange Juice	AK-1000 Salted Herring Red Cabbage Tomato	ditto
Salted AK-1000 with Tomato Skim milk	Papaya	AK-1000 Beef (ground) Okra Carrots	ditto
Gruel of AK-1000 with mashed banana	Grapefruit Juice	AK-1000 Ground Liver Red Cabbage Purslane	ditto
Pumpkin Soup skim milk	Mango	AK-1000 Fish Green Leaves	ditto
Yellow Sweet Potatoes with skim milk	Orange Juice	AK-1000 Salted Cod Fish Bean sprouts	ditto

CYCLE II

AK-1000 Sweetened with skim milk	Orange Juice	AK-1000 Salted Herring Carrots	ditto

Breakfast	*Snack A.M.*	*Lunch*	*Snack P.M.*
AK-1000 with Pumpkin	Mango	Sorghum - Red Kidney beans - Okra , Beef	Powdered skim milk
Salted AK-1000 ½ an egg	Papaya	AK-1000 Ground Liver Watercress	ditto
AK-1000 with Tomato	Lemon and Orange Juice	AK-1000 Pork Meat Cabbage and carrots	ditto
AK-1000 and Salted Herring	Papaya Juice	AK-1000 and Goat Okra - Green banana	ditto
Pumpkin Soup	Grapefruit	AK-1000 Ground Heart Green Leaves	ditto
CYCLE III			
AK-1000 with skim milk	Papaya	AK-1000 Herring Cabbage -carrots	ditto
AK-1000 with cod fish	Orange Juice	Sorghum Red Kidney beans Liver Green Leaves	ditto

N.B.: Usually the green leaves are the following items:
Bean Sprouts, Purslane, Spinnach, Pumpkin Sprouts.

We use also fruits such as:
Mango, Orange, Grapefruit, Melon Soursop, Citron

We use as sweetening: Brown Sugar, Black Strap Syrup, Rapadou

When the agricultural projects give us the product of their crops we use them in our menu alternating the cereals with AK-1000.

We usually receive: Sorghum - Rice, Dried Beans, Cornmeal, Tomato, Mango, Cabbage, Eggplant.

MENU CYCLE OF MOTHERCRAFT CENTER
Desarmes Haiti
Courtesy Dr. Warren L. Berggren
Hospital Albert Schweitzer
Saint Mare, Haiti

10¢ /child/ day

Day I:

Breakfast: Sweet Potatoes with milk and sugar

Sweet potatoes	8 kg
Milk	6 litres
Sugar	675 grams

Snack: Sweetened Fruit Juice

Juice	3 litres
Sugar	675 grams

Dinner: Pureed pigeon peas (Pois Congo) with corn, oil, & spices

Pigeon Peas	2.5 kg
Corn Meal	3.8 kg
Oil	200 gm.

Snack: Sweetened milk

Milk	6 litres

Day II:

Breakfast: Bread, Eggs, Sweetened milk

Bread	1.5 kg (156 g - 2.34 gm/child)
Egg	32
Milk	6 litres
Sugar	625 gm

Snack: Sweetened Fruit Juice

Orange Juice	3 litres
Sugar	675 gm

Dinner: Pureed red beans with sorgho, oil and spices

Red Beans	2.5 kg
Sorgho	4 kg
Oil	200 gm

Snack: Sweetened milk

Milk	6 litres
Sugar	625 gm

Day III:

Breakfast:	Rice with Milk and Sugar	
	Rice	1.5 kg
	Milk	6 litres
	Sugar	650 gm
Snack:	Bananas	32
Dinner:	Pureed Pigeon Peas with Cornmeal, goat meat, carrots, oil and spices	
	Pigeon peas	2.5 kg
	Corn Meal	3.8 kg
	Goat meat	950 gm
	Oil	200 gm
	Carrots	
Snack:	Sweetened milk	
	Milk	6 litres
	Sugar	650 gm

Day IV:

Breakfast:	Boulilie	
	Corn flour	1 kg 250
	Milk	6 litres
	Sugar	650 gm
Snack:	Sweetened Vegetable Juice	
	Vegetable Juice	3 litres
	Sugar	650 gm
Dinner:	Pureed red beans with sorgho, oil and spices	
	Red Beans	2.5 kg
	Sorgho	4 kg
	Oil	200 gm
Snack:	Sweetened milk	
	Milk	6 litres
	Sugar	650 gm

Day V:

Breakfast: Bouillion: Plaintains, Sweet Potatoes, Leaves, Ochra, tomatoes, oil and spices
Quantity not weighed

Snack: Sweetened Fruit Juice

Fruit Juice	3 litres
Sugar	650 gm

Dinner: Pureed Pigeon Peas with cornmeal, meat, vegetables, oil and spices

Pigeon peas	2.5 kg
Corn Meal	3.8 kg
Meat	775 g

Ochra, tomatoes, watercress not weighed

Snack: Sweetened milk

Milk	6 litres
Sugar	650 gm

Day VI:

Breakfast: Sweet Potatoes, Milk and sugar

Sweet potatoes	8 kg
Milk	6 litres
Sugar	650 gm

Snack: Sweetened Vegetable Juice

Vegetable Juice	3 litres
Sugar	650 gm

Dinner: Pureed red beans with rice, oil and spices

Red beans	2.5 kg
Rice	3.6 kg
Oil	200 gm

Snack: Sweetened Milk

Milk	6 litres
Sugar	650 gm

C F N I N E W S

CFNI sponsored a "Working-Party on Infant Feeding Practices in the English-speaking Caribbean", from December 10 to 12th 1968 at the UWI, Mona, Jamaica. The meeting was attended by a number of paediatricians and other workers in child health administration from the area, although unluckily influenza or dengue at the last moment prevented several from joining the group. No formal papers were presented, and the participants considered systematically various parts of the subject in turn, and concluded by discussing the possibilities of Caribbean-wide investigation into certain aspects of the present situation. One of the main aims of the working party was a free interchange of views and experience, and the participants were in general satisfied that this had been achieved.

On January 15th the course conducted by CFNI for the Diploma in Community Nutrition of UWI was opened formally by the acting Vice-Chancellor at Mona. The students will spend three months in Jamaica, six weeks in various Caribbean Islands, including Barbados, where for a month they will join the Barbados Government in a national nutrition survey, and will then spend seven weeks in Trinidad completing their formal studies. The course concludes with an individual three-month project for each student in his home country, making one academic year in all.

The course was planned for 30 students and actually there are 31. Almost all the governments in the area served by CFNI have sent students,

and there are also two doctors from the Phillipines sent through PAHO. All are either university graduates or persons with their appropriate professional qualifications and considerable experience in their field. All the main nutrition-related ministries or departments are represented, there being ten teachers and home-economists/nutritionists from Education; twelve from Health, including four from public health nursing, two hospital sisters, and four public health inspectors and the two doctors from the Phillipines; there are four agricultural extension officers and a lecturer from the Jamaica School of Agriculture; and there are four workers in Community Development and Social Welfar e.

The second week included a type of teaching rather new to the area, namely four sessions of a Human Relations Seminar in which our Diploma students participated jointly with the students in the Social Work course run by the Faculty of Social Sciences. The seminar was sponsored jointly by CFNI, UWI and the National Training Laboratory, USA, represented by Dr. C. Mill. This training, which is far from the formal lecture kind, is intended to develop a knowledge of group dynamics and an awareness of the actual and potential role of the student himself and his colleagues in working together for common goals. From the students' own evaluations it appears to have been a remarkedly popular and successful course, and the CFNI and UWI staff also learnt much from the experience.

NUTRITION, CFNI, AND THE COURSE FOR THE DIPLOMA IN COMMUNITY NUTRITION

Nutrition is a difficult, even ambiguous word, capable of many interpretations and misunderstandings, and is very frequently bedevilled by incorrect, fixed ideas or limited pre-conceived definitions.

Only too often nutrition is considered as synonymous with cookery, or associated in people's minds with cake decoration and the like. For others, it may be equated over exclusively with biochemistry, metabolism and the clinical sciences needed for the cure of " food and nutrition failures" - that is sick persons (especially young children) who have developed malnutrition.

Nutrition, as understood now-a-days, certainly encompasses the clinical aspects of malnutrition, the biochemical processes in health and disease, - and, indeed, the nutritional, aesthetic and other aspects of food preparation. Man does not feed on nutrients alone, but on pleasingly prepared, culturally and psychologically appealing dishes and meals, with all their overlay of emotional meanings and social significance.

Good nutrition - that is the supply of adequate quantities of nutrients - is basic for the survival of all living creatures. The whale has *his* needs for protein , calories and vitamins, just as does the amoeba and man.

Vote of thanks by Professor D.E. Jelliffe, Director, Caribbean Food and Nutrition Institute, at a ceremony opening the Course for the Diploma in Community Nutrition (January 15, 1959).

Without foods of the right quantity and, less appreciated, the right quality, disease - that is malnutrition, or even death occurs, whether in chickens taking too little thiamine, or in eighteenth century seamen developing scurvy on a Vitamin C deficient diet, or in infants fed too little protein.

Perhaps partly because of the obvious fundamental, life sustaining nature of nutrition, its complexity is not easily appreciated.

In all creatures, the acquiring of the correct food to maintain health, growth and vigour depends on many interdependent aspects of the local ecology - that is the complete environment in which they live.

For example, the available food supply,and hence the nutrition, of wild deer in the African savannah depends on many interacting forces in the local ecology, including the rainfall and grazing available, competition by other species, the numbers of carnivorous predators, and outbreaks of disease.

The ecology of man is, of course, immensely more complicated by, for instance, the elaborate system of ideas, customs and beliefs that his ancestors have devised and bequeathed to him - his culture pattern, and by modern technology which has revolutionized communications, crowded people into what have been termed "inhuman cities", and given man the technical knowledge to bend reluctant Nature to his service, to irrigate, to fertilize, to devise new insecticides, and to develop new genetic variants of crops, with higher yields and better nutritional composition.

The ecology of food and nutrition in the Caribbean is as complex as anywhere in the world - with many historical, cultural, economic and geographical moulding forces, including, for example, the pattern of agriculture,

the reliance on imported protein foods, the family structure, and the rising population pressure.

In fact, in the Caribbean as everywhere, the level of nutrition in a community, or in an individual, is the end result of many interacting forces, all influenced in turn by the social organization and the culture pattern of the group. These forces include the national and family economic level - the levels of general and technical education - the availability of nutritious foods from the garden and market, preferably locally produced - certain aspects of health, such as the widespreadness of immunization against whooping cough and other "nutritional infections" , and the existence of suitable health services, especially for mothers and children - and, lastly, what has been termed the "universal denominator" of this "equation" - the population size. Plainly if this, the number of mouths to feed, increases. faster than the food production, we are all running hard to get nowhere, we are trying unsuccessfully to walk up the down sides of the moving stairs.

If, as is increasingly recognized, this wide-spectrum view of food and nutrition problems is correct, it is logical to realize that improvement in the level of nutrition in the community is more likely if a combined attack is made, not by one group or discipline or specialty alone - but by a combine reinforced approach. In other words, the doctor, the public health nurse, the sanitarian and other health personnel have traditional (and newer, more imaginative) roles to play in treating the malnourished, in detecting and rehabilitating early cases, and in nutrition education in the hospital, the health centre and home.

But, the endeavours of those working in the health service are necessarily incomplete, and should form part of an interlocking programme together with the food producers, the educators, the family planners the economic developers and others.

As a simple example, if teaching mothers to feed protein-rich pigeon peas to their children is a major feature of nutrition education by health staff, the growing of pigeon peas should also receive emphasis by the agricultural extension service, and the value of this excellent food should be taught at school.

This coordination between different groups is, of course, easy to talk about, but, as experience has shown all over the world, it is much more difficult to achieve. In all countries, Ministries, Departments and Units have their frontiers and boundaries within which they tend to remain. Likewise, technically trained people have been conditioned by their education to think within the restricted funnelvision of their particular profession. The agriculturist tends to consider his endeavours in relation to economic profits, instead of *both* economic profit *plus* nutrition - after all the ultimate purpose of growing food is to feed people. Conversely, health personnel too often consider nutrition solely in its clinical context - that is the treatment of the sick individual in hospital, and even if oriented to prevention in the community, they often do not appreciate the non-medical aspects of human nutrition and its prevention, for example questions of food availability.

Happily, there are some signs in the world in general, and in the Caribbean in particular, of what may perhaps be called "the beginnings of

interdisciplinariness". In a number of countries, this is showing itself mainly by the development of some form of national committee or council for the coordination of activities of Ministries and Units concerned with food and nutrition - that is health, education, agriculture and community development, with a view to the development of a rational and effective food and nutrition policy. It seems likely that this type of development will continue, especially as the economic implications of over-reliance on food imports, especially protein foods, has been increasingly emphasized by balance of payments problems.

Also, it is more strongly appreciated by economic planners that good nutrition is one of the keystones of development of a country's human resources, and this has received additional reinforcement by recent indications that malnutrition in young children, due to protein shortage, may lead to permanent mental damage, and ability to achieve full intellectual potential even if well fed on recovery and later. The implications of widespread child malnutrition are apparent, especially in relation to a need for a highly trained population to achieve technical and industrial development.

It may perhaps be asked at this point - what is the Caribbean Food and Nutrition Institute? and what does it do?

Firstly, I would stress that the Caribbean Food and Nutrition Institute has an interdisciplinary staff - for example - the Director is a medical man, and the Deputy Director an agriculturist - and, as such, has, we believe, a role to play in the interdisciplinary approaches to improving the food and nutrition situation in the English-speaking Caribbean in collaboration with

colleagues in Jamaica and elsewhere.

It must, of course, be emphasized that there has been much endeavour and many advances in the field of nutrition in the Caribbean over the past years - for example, in Professor Waterlow's Tropical Metabolism Research Unit; in Miss Fox's Human Nutrition Unit of the Jamaica Scientific Research Council; at the Medical School and Faculty of Agriculture, UWI; in Dr. Byam's Trinidad Nutrition Unit, and in the numerous branches of nutritinn-related Ministries.

The Caribbean Food and Nutrition Institute, now two years old, is sponsored and staffed initially by the UN - by Pan American Health Organization and by Food & Agriculture Organization. It is an associated Institute of the University of the West Indies, and is funded by PAHO, FAO and the Williams-Waterman Foundation of New York, together with grants from the Governments of Jamaica, and of Trinidad & Tobago for the running of the two CFNI centres, situated at Mona and St. Augustine respectively.

In particular, CFNI sees itself as being in the "bridging business" as regards education, information and catalytic effect - between islands, between disciplines, between units, and between centres of research and the community.

CFNI has four main functions - advisory services, coordination, field investigation and training. Of these training of various types is one of the most important activities and the present course represents a major component in the planned CFNI educational programme.

The first course, leading to the UWI Diploma in Community Nutrition that is being inaugurated today is in many ways novel. Firstly, it is for 30 candidates from countries in the Commonwealth Caribbean, coming from a variety of different disciplines and ministries, including health, education, agriculture and community development. (We also welcome two doctors from the Phillipines to the course; their presence will add an extra international flavour).

Secondly, the course is to be practical, geared to priority community problems and mobile. The first three months will be spent in Jamaica; followed by field experience in various Caribbean countries, including Barbados ; followed by $1\frac{1}{2}$ months in Trinidad; followed, finally, by a three-month supervised in-service project on retun home.

The intention of the course is not to create a new cadre, but to widen the perspectives of those already working in some nutrition-related activity, so that they may be able to infuse a practical interdisciplinary bias into their work and into their teaching. We hope, in fact, to be able to obtain a good dividend for our educational investment by multiplier effects when our students return home. In particular, it is our hope and intention that next year, in 1970, that we will plan and undertake several shorter, "local" training programmes in various parts of the Caribbean, together with senior colleagues on the spot already working in food and nutrition, and with students who have taken the present course and returned home.

GENERAL NUTRITION NEWS AND OPINION

A CAUSE TO FIGHT FOR

Excerpts from a lecture by C.P. Snow, English novelist and scientist - from the New York Times - 13 November 1968.

Uneasiness seems to be becoming part of the climate of our time. Uneasiness with an edge of fear? Perhaps. It is a bad state. It can be a paralyzing and self-destructive state.

What is going wrong with us? Of course, we are not the first people in history to have this kind of experience or ask this kind of question. But we can deal only with our own time and speak only with our own words. It does seem - and though the feeling is subjective, it is strong and one can hear it expressed by the very young - that our world is closing in.

In many places and for many purposes, including some of the fundamental human purposes, there are already too many people in the world. Within a generation, there will be far too many. Within two or three generations - unless we show more sense, goodwill and foresight than men have ever shown - there will be tragically too many. So many that the ordinary human hopes will have disappeared.

We can't avoid any longer the fundamental trouble we are moving into: the trouble which in truth, we are already in. This has certainly contributed to our state of siege. Never mind our mental states, though. The trouble is elemental.

It is the contrast between the rich countries of the world and the poor. The fact that half our fellow human beings are living at or below subsistence level. The fact in the unlucky countries the population is

growing faster than the food to keep it alive. The fact that we may be moving - perhaps in 10 years - into large-scale famine.

Unfortunately, there are nearly twice as many people in the poor countries as in the rich. Further, there will - nothing can stop it - be an extra billion people added to the world population in the next 10 years. Of those, rather more than three-quarters will be added to the poor.

It is common ground that, in large parts of the poor world, in sections of Asia, Africa, Latin America, the collision between rising population and available food is very near. The demographers say that there is no method of curtailing population growth within 10 years. With great good fortune, and world effort, a little might just conceivably be done in 20 or 30 years.

They call on the agronomists to pull something out of the bag to give the demographers enough time. The agronomists - or a large proportion of them - make exactly the same demand in reverse. Can the demographers reduce the human increase soon enough to give them - the people working on tropical agriculture - enough time?

Most informed opinion believes that neither step is going to happen in time: that is the collision is going to take place. At best, this will mean local famines to begin with. At worst, the local famines will spread into a sea of hunger. The usual date predicted for the beginning of the local famines is 1975-80. The only rational ground for putting this date further into the future is the hope of increasing food production. In fact, this is the chief area of disagreement between responsible men. Here, as it happens, there is the glimmer, the ray of hope, that I mentioned.

The guess I should now make - as I said, this is no more useful than that of anyone else who reads the evidence - is that large-scale famine won't happen as early as 1975-80.

The major catastrophe will happen before the end of the century. We shall, in the rich countries, be surrounded by a sea of famine, involving hundreds of millions of human beings, unless three tremendous social tasks are by then in operation. Not just one alone, but all three. They are:

1. A concerted effort by the rich countries to produce food, money and technical assistance for the poor.

2. An effort by the poor countries themselves, on the lines of India and Pakistan, to revolutionise their food production.

3. An effort by the poor countries - with all the assistance that can be provided under 1 - to reduce or stop their population increase, with a corresponding reduction in the population increase in the rich countries also .

One hears young people asking for a cause. The cause is here. It is the biggest single cause in history. Simply because history has never before presented us with such a danger. It is a very difficult cause to fight, because it will be long-drawn out, it is going to need using political means for distant ends.

It is the duty of all of us and perhaps most of all of the generations which are going to live in what is now the future, to keep before the world its long-term fate. Peace. Food. No more people than the earth can take. That is the cause.

I should be less than honest if I told you that I thought it was likely to succeed. Yet we should be less than human if we didn't try to make it.

FOOD STORAGE PROBLEMS IN DEVELOPING COUNTRIES
from Newsletter of League for International Food Education, November 1968.

This important subject is discussed in a well rounded thorough manner in Chapter IV of "The State of Food and Agriculture 1968," published by the Food and Agriculture Organization of the United Nations (FAO) in Rome, Italy.

The article points out that there are two main aspects to the role that improved food storage can play. One is the avoidance of food loss, the second is the balancing effect of proper storage in the marketing chain from producer to consumer.

The costliness of modern storage facilities is pointed out by indicating that South American requirements for dry storage and grain elevators to meet its productive goals for 1975 would entail additional investment in the order of $620 million as compared to the period 1961-63. Thus it becomes necessary at all times to equate the desired food loss avoidance and balanced marketing with the high capital investment required to provide suitable storage facilities.

Notice is taken of the fact that consumption of perishable foods such as fruit, meat, vegetables, eggs, and dairy products, is steadily rising in the developing countries, creating demands for new forms of food storage.

Urbanization is proceeding rapidly and increased quantities of food will have to be channeled to the towns. This means that storage, in general, will assume increasing importance since there will be a necessary longer time lag between food harvesting and food consumption.

The subject of food losses due to poor storage conditions is carefully considered. It seems that there are very few reliable estimates of the loesses occurring from inadequate storage. Losses ranging up to 50% have been reported. However, while such figures may sometimes apply to local situations, they do not in all probability represent widespread area losses. Recent well-founded estimates for India indicate a loss of 6.6% in the storage of food grains. However, even such a relatively modest figure still amounts to a loss of 5.2 million tons.

The simple weight loss of food grains tells only part of the story. There may be losses in quality due to contamination by rodent hairs and insect fragments. There may also be losses in nutritional value resulting from insects feeding preferentially on the more nutritive parts of the grain or by chemical deterioration.

On a world wide basis, estimates of an expert FAO committee in 1946 were that world storage losses for cereals, legumes, and oil seeds were of the order of 10% (5% from insects and mites, 4% from rodents, and 1% from mold fungi). From a study in 1962 in Northern Nigeria, it was concluded that the sorghum loss was 115,000 tons which would have satisfied the usual cereal requirements of 1.3 million people.

An important requisite for satisfactory storing of grains is that they be cleaned and dried to an acceptable moisture content. In practice, this is often difficult because of the primitive facilities available. Also in some countries the marketing systems are such that the farmer has no incentive to dry his grains to an acceptable moisture level for good storage.

The article states among its conclusions that too many of the misplaced or wasteful investments in storage in the developing countries reflect efforts to sell a specific storage design, recommendations based on engineering concepts of efficiency suited to countries where large volumes of grain are handled in bulk, and credit tied to purchases from a predetermined source.

CONTRACT AWARDED FOR FIRST FISH PROTEIN CONCENTRATE PLANT
from Feedstuffs - November 9, 1968.

ABERDEEN, WASH. - A contract to design, build and operate the nation's first, large fish protein concentrate (FPC) pilot-demonstration plant was awarded to Ocean Harvesters, Inc., Los Angeles, by the Department of the Interior, Bureau of Commercial Fisheries.

The eventual cost of design, construction and first year operation of the new facility will be more than $2 million. The plant is scheduled for operation during the 1970 fishing season.

Fish protein concentrate, a high-protein powder, is manufactured from hake. FPC from hake was approved by the Food and Drug Administration for human consumption in 1967. It contains more than 80% animal protein.

A Bureau of Commercial Fisheries report said the concentrate blends well with other foods and materially enhances their nutritive value. It has been successfully tested as an ingredient in beverages, soups, gravies, noodles, bread and cookies.

PROTEIN AND CALORIE REQUIREMENTS IN EARLY CHILDHOOD

At the recent working party on Infant Feeding Practices held in Jamaica, Professor Waterlow asked whether the protein and calorie requirements of children were familiar to paediatricians and public health personnel. In his experience, doctors and nurses tended to devote considerable attention to prescribing and administering drugs in precise amounts, and to neglect the important question of food requirements. As a result, Professor Waterlow was asked to provide the relevant data as a guide.

The following table summarizes the recommended intakes proposed by WHO and FAO.

Age	Weight (kg)	Calorie intake Cal/kg/day	(total/day)	Reference protein g/kg/day	(total/day)	Practical allowance (total/day)
Birth	3.5	120	420	2.3	8	10
3 mths	5.7	120	680	2.3	13	16
6 mths	7.6	110	840	1.8	14	17.5
1 yr.	10.0	100	1000	1.2	12	17.5
1½ yr	11.4	100	1150	1.1	12	17.5
2 yr.	12.6	100	1300	1.1	13.5	19
3 yr.	14.6	100	1450	1.1	15.5	22

Notes

1. Weights = Harvard standard, 50th percentile, boys.
   If subjects are underweight for their age, they should still have the proper amount for their age. Excellent results have been achieved with calorie intakes of 150 cal/kg/day and over, in the treatment of malnutrition.
2. Calorie requirements taken from FAO Nutritional Studies No.15,1957.
3. Protein requirements taken from WHO Technical Report Series No.301, 1956.
4. "Reference" protein = protein which is 100% utilised (ideal)
   "Practical" = assuming that from birth to 6 months, protein is from milk with utilisation of 80%, and from 6 months onwards protein is mixed protein with utilisation of 70%.
5. It is of interest to note that breast milk provides a ratio of protein to calories similar to that recommended above.

HOW I GET MOTHERS TO BREAST FEED *

by
Dr. E. Robbins Kimball, Illinois

Editors' note: We think that this view of the subject from the United States contains some helpful guidance relevant to the West Indies context and should interest some of our readers.

The first responsibility of the physician with regard to breast feeding, in my view, is to show mothers how to nurse, not to ask them if they want to. The benefits of breast feeding are so overwhelmingly manifold that to give primary consideration to alternatives is to do a disservice to the child and the parents. And it also does a measurable disservice to the physician.

The function of the human breast is to produce milk. It will do so continuously until menopause except when subject to the suppressing effects of the estrogen produced during late pregnancy. Practically every woman can produce surplus milk. Still, fewer than one of every four children born in the United States today is breast fed.

Why so little breast feeding?

The problem is not the ability to produce milk. It is getting the milk from the breast into the baby. Or, as the military would say, it is a problem of logistics. The breast-feeding problem in our present-day American culture involves overcoming many obstacles and opponents.

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*Reproduced from "Physician's Management", June 1968.

The *doctor* can be one of these obstacles, but he shouldn't be held solely responsible because he is essentially part of a larger cultural problem. For the past half century the emphasis in medical education has been on artificial feeding. In medical textbooks three to ten times as much space has been assigned to the subject of artificial feeding as to breast feeding. The emphasis is on getting the baby fed, making sure that food is going into him, and if artificial feeding seems to give the surest evidence to the doctor that nutritive feeding is going on, then artificial feeding is preferred.

It is often the case that today's general practitioner, already overworked, doesn't want to bother with the time-consuming and continuing job of promoting and counselling breast feeding among his patients. He prescribes formula.

The pediatrician knows more about writing formulas than the processes of human milk production and suckling, and at any rate, after days and nights of caring for sick children and working with worried parents he may be too tired to "fight another battle."

The obstetrician is primarily concerned with the mother. The baby tends to become a by-product. Or as one author, Karen Pryor, puts it in her excellent book, Nursing Your Baby: "In this day of specialists the nursing mother is in a medical no-man's-land. Her breasts are the concern of the obstetrician, the milk within them is the concern of the pediatrician."

Yet doctors are not the only obstacles to successful breast feeding.

Nurses tend to amplify the attitudes of the physician they work with. If a doctor does not encourage breast feeding, the nurses around him probably won't either. But whether or not the doctor is pro-breast feeding, nurses typically are extremely busy; breast-feeding mothers require assistance; and because the routines in many hospitals are not conducive to breast feeding, many nurses just don't feel they have time to give such help.

Obstacles and opposition to breast feeding aren't left behind at the hospital when the new mother and baby end their confinement and go home.

The husband may oppose breast feeding for a variety of reasons, some obscure and basically psychological - he may be jealous of the nursing infant coming into such intimate physical contact with his wife. Other fears are quite obvious: nursing may be inconvenient socially; it may interfere with after-hours business engagements; or it may, the husband thinks, ruin his wife's figure by causing her breasts to shrink in size or sag and grow shapeless.

There are other problems at home too, Housework may have piled up in the mother's absence. Older children may be clamouring for care, for help, for attention. There probably is much pressure to get back into the household routine, but this is a dangerous temptation that the mother who wants to breast feed must not surrender to. If she is not to do so, however, she will need *household help*, and this may present still other obstacles.

I have noticed that if the help comes from a woman giving nursing assistance, the helper, perhaps frustrated in her own marriage and childbearing experience, may want to claim sole credit for the thriving of the

infant, and this will mean getting it away from the mother's breast. Similarly, the *grandmother*, whether she is the new mother's mother or the father's, quite possibly will want to eliminate breast feeding. She may do this perhaps by the subtlest of means, simply because at root she was unsuccessful herself at breast feeding.

In my 28 years of practice I have had only 11 mothers who breast fed with their mother-in-law in the home.

Then there are the *friends*, phoning and visiting, who may comment on the "inconvenience" of breast feeding, its "effect on the figure," the "time it takes", the "awkwardness" it may present with housework or an outside job.

The new American mother

Finally, there is the one person we haven't mentioned yet. And so here she is, the new American mother, her infant beside her, her breasts ready to produce milk, perhaps engorged drumtight with it, yet she is being pushed and pulled on all sides to eschew breast feeding, and perhaps she already has been given dry-up pills. What does she do?

What she does seems to depend to a large degree on how much education or money she has, or both. It is significant that the most ready acceptance of breast feeding in the US today is among many college-educated young women and among the poor. Breast feeding seems to find least acceptance among those of less schooling and moderate to lower incomes, such as the wives of blue-collar workers and service-industry personnel.

Although formerly I strongly promoted the idea of breast feeding from the time of the first contact with the patient, I now make every effort to defer discussion of this subject until the first contact with the mother and newborn in the hospital.

Hormonal function

The reason for this timing and approach is simple. Breast feeding is not an intellectual activity. From the standpoint of the physician who recognizes the benefits, breast feeding is not something that the mother should be urged to accept or reject on a purely rational basis before the real, living infant is at hand - or in arms. Once the child has come, the decision does not need to be made intellectually. As the infant lies in her arms, needing love, food, and care, it can be made , in effect, hormonally.

At Evanston Hospital, Evanston, Ill. where many of my infant patients are born, the atmosphere is conducive to breast feeding. Evanston has rooming-in facilities in its maternity section. The obstetrician, pediatrician, resident, intern, medical student, and nurse are thoroughly oriented in caring for the nursing mother.

The new mother is not asked if she wants to breast feed. It is assumed that she will do so.

As natural as breast feeding is, however, it is not something that all new mothers can do with automatic success. It takes most new mothers two or three weeks to learn how to nurse, and usually two months to become adept at the procedure.

How to get started

I begin the learning process with the mother as soon as she has recovered from labor. We discuss several broad topics, including, how to get started in breast feeding; avoiding discomfort while nursing; the physiology of lactation, including the letdown reflex; and the success of breast feeding as evidence of the success of the whole woman.

And this last point cannot be overstressed to the new mother, for as F. Charlotte Naish states in her book, *Breast Feeding:*

"Giving milk is not just a function of the breast. It is a function of the whole woman, in which the breast merely does the last part of the work."

To nurse successfully, the mother should not be overly nervous, anxious, angry, or tired. The control of these damaging factors is a pervasive part of what I consider to be the five essentials of a nursing program.

In all of these phases the approach of the physician must be artful, patient, understanding. To encourage and help the mother in breast feeding, the pediatrician cannot be the cold scientist or the brusque, busy practitioner to whom the breast is just another bodily part. He should instead be kindly, helpful, and directive. Women at this point in the bearing and care of the newborn want to be helped by someone who will tell them what to do and how to do it.

Gentle guidance

My approach in encouraging and guiding breast feeding is to act toward the mother as if I were perhaps a relative, treating her with gentle kindness at all times, offering understanding and help when requested, and giving knowledgeable direction when I think it necessary.

Not only do I avoid discussing breast feeding until *after* the baby has arrived, I also do not examine the breasts until that time. The reason, again, is to let the mother's own body and the baby do the convincing.

At that point, with the mother having recovered from labor, I begin the five-phase nursing program:

1. With hands scrubbed and still wearing a gown I call on the mother in her hospital room.

First I examine the mother's breasts and nipples and demonstrate the technique of hand expression. This is an important technique to master because using it, the mother can bring milk to her suckling and so prevent him from being frustrated and disappointed when he first gets to his source of food.

2. Explaining to the mother that she has a good 95 percent chance of success at breast feeding, I show her how to put the baby to breast and to take him off without hurting the nipples - stroking his cheek and mouth with nipple stimulates him to open his mouth and take the nipple; after he has been nursing long enough, holding his nose for about 30 seconds will make him let go.

An understanding of suckling, milk flow, and lactation are important, and I explain these. I point out that the baby does not actually suck the breast to make the milk secrete. He milks it by the combined action of his tongue thrusting out under the nipple and quickly drawing the nipple back into the mouth toward the pharynx as the gums bite down on the areola, squeezing the milk-collecting sinuses in this area.

Making milk in the breasts and giving milk from the breasts are two separate processes, and this distinction must be made clear to the mother if she is to breast feed her baby successfully. Any new mother can produce milk in her breasts, but she cannot give it from her breasts to her baby in sufficient quantity unless she is at ease and confident. The pediatrician should help her understand this distinction.

The let-down reflex

The link between making and giving is a nervous-hormonal process often called the let-down reflex. This is the function that gets all the milk from the breast into the baby. Not only doesn't the baby suck milk from the breast, he doesn't really "take" it by any means. Instead, the suckling action is a stimulus to the mother's body, including the breasts. The breasts then give the milk.

The tactile sensations of the baby's mouth on the nipple travel along a neutral circuit to the pituitary gland which releases the hormone, oxytocin, into the bloodstream. The oxytocin, traveling to the breasts, stimulates the breast basket cells which are muscular structures surrounding the alveoli and milk ducts, and they compress the alveoli and expand the ducts. This forces milk down and into the sinuses behind the nipple, and about 30 to 90

seconds after the infant first takes the nipple the let-down reflex is completed, with milk oozing or running from the nipple, perhaps jetting and spraying out as far as 12 inches.

Unless milk lets down, the infant can get no more than about one-third of his mother's milk, and none of the fat content. Since half the total caloric value of human milk is in its fat content, the importance of a properly functioning let-down reflex is clear.

3. The comfort of the new mother's breast is a critical factor in the success of breast feeding, especially in the first days after the baby is born. The whole breast can become painful if it is engorged with milk. This can be prevented by working with the mother to perfect the let-down reflex so that the breast will empty.

The nipples can become sore for a number of reasons, including, again, a let-down reflex that is inadequate, causing the baby to chew too much trying to get milk.

In the hospital I examine the nipples daily for evidence of trauma. During the first few days, to prevent sore or cracked nipples I tell mothers to limit nursing to one minute for each breast at any one time, but, if neçessary, to nurse twice from each breast during a given feeding.

I also discuss cleansing of the breasts, using merely water or a mild soap and water, and toughening of the breasts to make them less susceptible to soreness. In our culture the breasts are always shielded behind at least one or two layers of clothing and so naturally are quite sensitive to the kind of punishment that nursing imposes. I tell mothers that their reistant to nursing wear and tear by exposing them to sun light or sun lamp

irradiation and to fresh air and by other practices such as drying them vigorously with a rough towel after bathing.

4. During the first two weeks, I specify for each mother a strict but individualized schedule of rest. The baby is allowed to control the number of daily feedings, which may come every three or four hours or more often.

For the first three days after returning home the mother is to spend all or nearly all her time in bed because during this crucial period new mothers tend to become depressed and may lose their milk before lactation has really begun. Then, during later periods, the rest schedule calls for three one-hour naps during the first month and after that time, until weaning, either two one-hour naps daily or one two-hour nap.

Concerning the amount of breast milk produced, I tell the mother, as she begins nursing her new baby, not to be worried even if she is giving only ½ ounce each feeding. In helping a new mother to nurse, getting her started to actually feed the infant is the first object; getting as much milk as possible is secondary.

There are, to be sure, desirable amounts of breast milk for the infant as he grows. By the seventh day he should be getting 1¾ ounces for each pound of the birth weight. By the end of two weeks he ought to be getting not less than 14 ounces a day.

"Danger weeks" is the name given to the period from the second to eight week because this is the time of the critical early growth of the infant. Also, it is during this period that the mother ideally should be developing her let-down reflex if she is to be able to nourish her baby wholly or for the

most part on breast milk for a reasonable length of time, say, six or eight or perhaps 12 months.

5. In talking with the mother I persistently express optimism in her ability to nurse successfully, and I note her general condition, including not only her organic health but her morale, her tensions, if any, and her appearance. I look to see whether she has what I call, in my practice , the "Four-Plus Picasso Look," a look of serenity which is found in one of the figurative paintings of the great Spanish painter and a look I have found in the faces of many mothers who are successfully and happily breast feeding their babies.

Father can help

The father can be of great use in helping and supporting his wife throughout the period of breast feeding and particularly when problems arise.

An approach to nursing problems that I have found particularly helpful is one I have called "Booze and Snooze".

Say the baby wakes crying hard. The mother changes his diapers. Still he cries. Se nurses him, but the crying continues. Apparently she isn't relaxing enough to let the milk down or the baby is too upset to nurse properly.

The father can help calm and happiness to return. He does this by settling his wife comfortably in bed or a lounge chair with the baby, then pouring her a glass of wine; mixing her a light highball or a cocktail; or perhaps best of all, because of its food value, getting her a cold glass of beer. He gives her the drink and takes the baby. She drinks it, drifts off into a refreshing nap, and awakes a short time later ready to nurse her

baby (research shows the baby does not get any alcohol in the milk from such light imbibing).

Nor is this approach out-of-bounds for the teetolater. For alcohol is not really its essential ingredient. It's the attitude of seeking a state of relaxation that is central.

I know of two mothers who abstain from using alcohol because of their religious scruples, but they make use of this approach, substituting hot tea for alcohol. It works.

With all the possibilities for problems in breast feeding, is it worth the struggle? The answer is a loud, "Yes!" There are statistics to justify the assertion.

In one pilot study of 173 children followed from birth to age 10, including both breast-fed and non-breast-fed youngsters, I found that children who had not been breast fed had:

4 times the respiratory infections

20 times the diarrhea

22 times the miscellaneous infections

8 times the eczema

21 times the asthma

27 times the hayfever

11 times the T and A

4 times the otitis media

*Breast feeding contributes to the more rapid involution of the mother's uterus.

*Breast feeding has important psychological advantages for the mother

and infant, helping them get acquainted more quickly and forming a close relationship.

*There is statistical evidence that mothers who breast feed are less likely to have cancer of the breast. One research study puts the chances at 1 in 25 for women who have not breast fed and 1 in 125 for those who have nursed a baby for six months.

*I also am convinced that the ultimate effect of nursing on the mother's breasts is to help them remain shapelier for a longer period of her life.

The illness-comparison study referred to previously shows that among children who have not been nursed there are:

11 times the hospital admissions

8 times the house calls.

In this connection there are other telling factors that the statistics don't show. These are less tangible, and they probably reflect not only the general health of the mothers and children where there is breast feeding but also the basic family attitudes.

Mothers who are breast feeding tend to be tougher, more resistant to illness. The children get sick less often than non-breast-feeders and when they are sick they are, in effect, less sick. Therapy in such families also is easier to prescribe, to manage.

A less hysterical practice

This felicitous, healthy atmosphere may be part of a total family attitude or esprit. Such people seem to me to be less brittle. Generalization always is dangerous, but it seems that typically it is the parents of the non-breast-feeding family who insist, when they call about illness, that

the doctor, "Get right over here because it's serious!" In general, the practice that includes breast feeders is a less hysterical practice.

Illness of the nursing mother, like numerous other conditions related to breast feeding, is a subject of much mythology and misinterpretation.

There definitely are some contraindications to breast feeding. These include open tuberculosis in the mother; harelip and cleft palate in the child; and nephritis, conditionally. Also, acute illness may cause her milk to dry up.

Yet just any illness is not necessarily a contraindication. Contrary to a common belief of both laymen and some health practitioners, mastitis and breast abscess need not keep the mother from nursing. I have guided nursing mothers, with only temporary interruption, through such conditions and also through gall bladder attackes, grippe, mumps, hemorrhage requiring curettage, toxemia of pregnancy, and (in the infant) erythroblastosis fetalis, and prematurity.

It is not true that some mother's milk is too thin and watery or otherwise unsuited for her child. The milk that a mother produces is right for her children. And if it is thin to begin with it will richen as the let-down reflex is developed.

It also is not true that some women are not the breast-feeding type or cannot breast feed because of their responsibilities.

Flat-chested women can breast feed as well as the buxom.

Women with large families and outside activities can breast feed.

Students and working women can breast feed.

One of my patients, working for her doctorate in science and committed to completing experimental work that could not be postponed or interrupted, took her breast-feeding infant to the laboratory and bedded him down in an adjacent ladies' lounge while she conducted her research.

A university librarian, who conveniently lived next to the campus, left her desk at feeding times, hustled home to nourish her infant, and was back at work in only a few minutes.

A jewelry store clerk, whose employer couldn't spare her, took her nursing baby to the store, keeping him in a back room.

These women plainly were determined to breast feed. When a woman really wants to, she can do it.

YOUR QUESTIONS ANSWERED

Q. Mothers often believe that various starchy gruels are especially good foods for their infants. What should be our nutrition education in this regard?

A. In many parts of the world, including industrialised countries, the first semi-solid food is often a smooth paste, porridge or gruel based on a local cereal or other mainly carbohydrate food. This type of preparation is easily masticable, and can be swallowed and digested easily by the baby.

In the West Indies, one finds rather strongly held views in different countries. For example, in Guyana, plantain flour porridge is regarded highly as a baby food, while elsewhere arrowroot or corn meal may be much prized for this age-group.

It is always desirable to base one's nutrition education on existing practices and, in this particular case, it would be best to suggest using the currently favoured gruel, but, at the same time, trying to persuade mothers to "reinforce" this nutritionally, particularly with sources of animal protein (e.g. milk, etc.), and/or with rich sources of vegetable protein (e.g. skinned mashed red beans, etc.)

If several gruels are used in the particular community, then nutrition education should emphasize the more nutritious, with a special reference to protein. For example, if both arrowroot and cornmeal porridges are used, the latter should be recommended because of its higher protein content.

Q. Is cod liver oil necessary for young children in the West Indies?

A. Cod liver oil has usually been given to young children because of its high content of Vitamin D (350 I.U. per c.c.). Its use in the Caribbean has largely been as an imported idea from the UK, where cloudy, relatively sunless conditons make rickets such a real risk that the condition was known as "English disease" for many years.

Rickets is rare in children in the West Indies, because of the ample opportunity for irradiation of the skin with the ultraviolet light (UVL) of sunshine. However, rickets can and does occur in the slums of some tropical cities, where little UVL reaches children, and where various cultural practices lead parents to keep their offspring out of the sun. Thus, the condition is quite common in Calcutta and in many countries along the North African coast.

Cod liver oil has also been used for other reasons - for example - as a source of Vitamin A and essential unsaturated fatty acids. It may also be employed in some circumstances as a traditional "hand out" or placebo, designed to help to reassure mothers.

In countries where Vitamin D deficiency is made very likely by the prevailing cold, overcast climate, various other sources of this nutrient are now-a-days available. For example, many brands of milk are reinforced with Vitamin D, while proprietary poly-vitamin mixtures are widespread.

It would be better in West Indian circumstances to jettison this inappropriate import and to concentrate on other matters which have a higher priority.

Q. It has been stated that much advertising of foods especially infant foods is harmful. Why is this so and how can this be counteracted?

A. The highly successful advertising of food stuffs through mass media, posters supermarket "specials" radio, television can be a harmful practice . It reaches all groups of the population including the less affluent and less educated, who naturally often lack critical awareness and are unable to sort out myth from reality and appreciate that highly expensive products are not necessarily a better bargain.

Maternal instinct to obtain the best for one's offspring is a strong and decisive urge, and a compromise between keeping up with the Jones' plump baby and the shillings in hand has to be made to the detriment of the quality of the product used and of the recipient, the child. Thus, for example, a high grade but costly milk, which may be quite satisfactory when used in the correct proportions in a middle-class home under sanitary conditions, may in these cases be overdiluted to make it last longer, often mixed unhygienically and given in homeopathic dosage by the poorer mother to her child, who on such a regimen will soon join the pathetic band of "non thrivers" .

The necessity for consumer education among all groups, especially the lower socio-economic segment, is a pressing need and health workers in hospitals and clinics can do much to improve the situation.

It is important for doctors and nurses to know what types of milk are available in the country in which they work, i.e. their price, exact contents of tin, vitamin content and all other relevant details (be it full cream, half cream, skim milk, artificial "filled milks"). They will thus know what

the consumer is getting for her money. They can then select the cheapest good quality milk available and keep it in their clinics having scrupulously beforehand removed from the clinic walls, posters and calendars advertising the more expensive products so as not to confuse the mothers.

Nurses very rarely appreciate to what extent they have become the unpaid sales agents for the commercial firms. If stocks of free donations of expensive brands of milk are available for needy mothers, it is preferable to give out this milk in plastic bags or unlabelled tins, so that the mother will gradually decide to use the milk recommended at the clinic.

Talks given to mothers should include advice on budgeting using visual aids, showing how money saved by switching from an expensive to a cheaper but equally satisfactory brand of milk can buy other nutritious items for the child or the family.

Q. *What is meant by a second class protein? Why has such a rating been given to these foods?*

A. Protein , first described in 1868, constitutes the prime material of the bodies of animals and plants. Protein foods were then classified as those containing all necessary amino-acids, the animal proteins, and were named first class proteins, whilst the rather derogatory term, second class protein, was applied to foods from the vegetable kingdom in which some of these amino-acids were lacking.

This terminology has unfortunately been perpetuated by generations of nutritionists and a raising of the status of the vegetable protein in the community of foods is long overdue.

In earlier issues of Cajanus, recipe books dealing with the bean as a source of protein,and Dr. Aykroyd's and Mrs. Doughty's important contribution on leguminous foods, were reviewed. They emphasize the importance of such vegetable protein foods in the nutritional world situation of today.

Most of the world population survive on a judicious mixture of vegetable proteins in which amino-acid deficiencies are made good and a composite protein of better biological value is thus obtained. Without these cheaper sources of protein, a greater state of malnutrition would exist in the world as a whole than is the case at present.

Vegetarian communities have lived well on an exclusive dietary of these foods, and for these people cereals and legumes are virtually their sole source of protein.

Our slogan should not be "All proteins are good but some are better than others" . "All protein foods are good, and vegetable proteins are excellent as long as we know how to use them together".

With the prevailing cost and unavailability of animal protein, sources of vegetable proteins are increasingly of prime importance for the survival of the human race.

READER'S LETTER

(from Dr. Kendall W. King, Assistant Vice President, Research Corporation, New York.)

Dear Sir,

I was interested to read in Cajanus No. 6 the article on "Cost Effectiveness of Child Nutrition Programs." What the author is getting at is, I think, extremely important, and he is quite right in feeling that too little thought of this kind is involved in the world's programs supposedly combatting malnutrition in the child.

Regarding the Cost-effectiveness of Mothercraft Centres in Haiti, Dr. Warren Berggren of Deschapelles has made some calculations. If an average centre costs $1,500 per year and serves 90 families, that is $17 per family per year. Since the average family contains a little over three children, that is approximately $5 per child per year. At Deschapelles pediatric beds cost about $12 a day, with an average occupancy of 60 days for malnutrition cases. That comes to $720 per case. Thus, if a centre in a village reduces the number of hospital-requiring cases of malnutrition by two in a year, the program has reached the break-even point. In the Haitian situation the savings are far in excess of this.

Not accounted for, of course, in this way of looking at it is the fact that, as an outgrowth of what is taught in Mohtercraft Centres, the nutrient intake of even adults is shown to increase very significantly, thus increasing their working productivity and their earnings. One has furthermore improved the general health status in the village and thereby reduced

medical expense, and it can be reasonably argued that the improved overall nutrition status of the community will reduce the incidence and severity of a number of diseases.

However, the problems of making reasonable quantitative estimates of savings for this latter group of factors are very difficult indeed.

Nevertheless I urge you to continue to stress the economic factos . involved in malnutrition and in programs to combat malnutrition.

Yours sincerely,

Kendall W. King.

17 January 1969.

OILSEED PROTEINS *

by

Dr. Max Milner
Senior Food Technologist, UNICEF.

The potential of oilseeds as new sources of eeible protein becomes immediately apparent from an examination of the statistics relating to their global production, in comparison with traditional sources of protein used in the human diet.

The major oilseeds, including soybeans, peanuts, cotton-seed, sesame, coconut and sunflowerseed, can provide about 25 million metric tons of protein in edible form. The magnitude of this potential is evident from the fact that the world supply of conventional animal foods (milk, meat, eggs and fish) expressed on a comparable basis, provides about 8.5 million metric tons of protein. Legumes and nuts supply about 8.5 million tons of protein andthe world's primary source of protein, the cereals, including wheat, sorghum, barley, oats, maize and rice, provide somewhat more than 75 million tons.

Production of the world's first oilseed resource, soybeans, which has been a traditional food source in certain cultures, is now approacj ing 40 million metric tons with a protein equivalent of about 15 million metric tons. Its production is almost equal to the sum for the next two major oilseeds cottonseed and peanut, and soybeans provide 40% of the world's oilseed tonnage. It may be of interest to note also that 75% of the world soybean crop is produced in a single country, the United States.

*A paper presented at the CFNI Conference on "Protein Foods for the Caribbean, Georgetown, Guyana, 29 July - 1 August, 1968.

It appears unfortunate that this valuable protein resource is virtually absent among the agricultural products of countries whose need for protein is the greatest. As a matter of fact, with the introduction of the new high yielding rice varieties, there may appear a tendency, for example in Indonesia, for a reduction in the already inadequate level of soybean production. It is unfortunate that few alternative crops important for balancing nutritional requirements, can compete with these new varieties on a sheer quantitative production basis.

Cottonseed, the oilseed next in prevalence, is more widely distributed than is soybean. Most tropical and sub-tropical areas, which include many of the developing countries, produce cotton. Major producers are India, the USSR, the USA, Mexico , UAR, Brazil and Pakistan.

Peanut production, like that of cottonseed, is also more widely distributed than soybeans, with India and several West African countries being major producers. Sesame production, like that of coconut, is much smaller.

As for current channels of utilization of oilseed proteins, precise breakdowns of use for animal feeeing and fertilizer are somewhat difficult to obtain, but one fact certainly does stand out - very little is either processed or used at present for human food. For all practical purposes, about 85 percent of the U.S. soybean crop, i.e. the part not exported, is crushed for oil, and the meal is fed to livestock, principally as poultry feed. Possibly 2 to 3 percent of the crop is processed for food in the U.S.A. Soybeans and their products, including oil, constitute the largest single U.S. agricultural export today. Most of

these materials go to Western Europe and to Japan for animal feeding. where a rising standard of living is calling for increased amounts of animal protein in the diet.

We may take India as a typical developing country in terms of the pattern of utilization of oilseed protein in by-products. There is virtually no soybean production in India. Peanut, the largest oilseed crop (normally about 5 million tons annually) is the mainstay of the country's edible oil supply. Peanuts are crushed for oil by obsolescent and inefficient technological means. About 10 percent of the defatted cake nay be exported. Only insignificant quantities are used as food and little more for animal feeding. Informed estimates suggest that 80 percent of the India peanut press cake, containing up to about 40 percent protein (not to mention residual oil of 10 percent or more), is used primarily as manure. There is obviously both tragedy and challenge here when one considers that many segments of the population suffer from serious protein malnutrition and a rational and effective use of this resource has not yet developed. Utilization of cottonseed, the second oilseed crop of India, is also pertinent. Because of several factors including the generally obsolescent oilseed processing technology employed, and a conviction among farmers that whole seeds are superior to pressed cake for cattle feeding, only about 20 percent of this vegetable resource is recovered for human food.

With these facts in mind, the questions become clearer: Why do these patterns of utilization exist? Why, except for soybeans to a limited extent and possibly sesame, have processed oilseed proteins been used

hardly at all as human food? Why, indeed, in its painfully pragmatic approach to food selection, even in times of scarcity and starvation, has the human race rejected these traditional protein concentrates as food?

Much of the answer is obvious from a casual visit to even a modern oilseed plant which is processing peanut or cottonseed for oil.

The procedures employed emphasize the recovery of oil as the primary product while the meal or press cake generally received scant consideration in terms of nutritive and sanitary standards which would be essential for food use. Generally, these by-products are fibrous in nature, containing large quantities of hulls, soil and other debris, and in most cases they have been overheated to the extent that the protein nutritive quality is severely impaired. The point I am trying to make is simple - every improvement and economy which has been developed for oil recovery has tended to downgrade those qualities of protein necessary to provide palatable, nutritious and sanitary food.

Some recent scientific discoveries have suggested additional reasons why these materials have not been used traditionally as food. I refer to the problems of fungal toxicity and intrinsic antibiological factors. In retrospect we must acknowledge, if not indeed endorse, the pragmatic wisdom of our ancestors in rejecting materials of this kind as food. However, as scientists and technologists, we must accept a rather major challenge in attempting to reverse these age-old traditions and practices.

I wish in this paper to emphasize past developments and future potentials of those oilseeds and their products which have received the most attention as protein food resources. Thus I plan to emphasize the

edible protein products derived from soybean, cottonseed and peanut, and to give less attention to materials derived from sesame, coconut and sunflower. In passing, it may be noted that some rather exciting and highly practical developments have appeared recently in the production of edible and nutritious protein concentrates from the traditional non-food by-products of wheat and rice milling.

Soybean Protein

Soybean deserves first consideration in this discussion because of its already long and honourable history as a food resource, notwithstanding the major problems of undesirable flavour constituents and toxic antibiological factors which characterize the mature seeds, and which present major difficulties in food processing. The admirable and empirically effective traditional soybean food processes and uses of S.E. Asia such as soybean curd (tofu, tahu) made by precipitation of the protein from heated aqueous extracts using calcium and magnesium salts (traditionally seawater), which also provides a base for cereal mixtures (natto, miso) unfortunately do not appear to offer gastronomically attractive products to cultures beyond their area of original development and use. That these pragmatic processes are effective in removing the deleterious flavour and biological factors is obvious. Similarly the tempeh of Indonesia, produced by cooking following Rhizopus fermentation of soaked decorticated beans, seems to have little appeal to the food tastes of other regions. Close study of the S.E. Asian experien ce with the food processing of soybeans suggests that as commendable as these processes are for the food processing of soybeans, particularly at the home and village levels, they

do not apparently lend themselves easily or economically to technological adaptation for larger industrial-scale food processing.

Notwithstanding this judgement, I am firmly convinced that the soybean is on the threshold of making increasingly large and important contributions as a food protein resource, when processed in new or unconventional ways into a variety of food forms.

Soybean milk, for example, has until recently made very little impact as a nutritious beverage even in S.E. Asia, notwithstanding the fact that aqueous soybean extract has been prepared traditionally as the first step in tofu production. There are indeed successful examples, as in Hong Kong, of large scale commercial production and marketing of bottled soy beverage based on extraction procedures. Nevertheless, in the expanding efforts underway to produce and market this beverage more widely, other processes are required, for example one based on aqueous suspension of full-fat soy flour produced by low-moisture, high temperature, short time processing.

The modern counterpart of tofu, namely soy protein isolate first used commercially in the U.S. as paper coating and glue, has become increasingly important as a starting material for a variety of sophisticated foods including the meat analogs produced from spun soy protein filaments. At an intermediate level of sophistication and cost but of considerable novelty nevertheless, are the textured soy foods produced from soybean grits and flours by extrusion at high temperature to form textured foamy masses which can be rehydrated into meat-like pieces. A similar product is obtained by very rapid heating of hydrated relatively soluble protein

flours under agitation, followed by rapid cooling. Markets for these relatively sophisticated products are growing and it may well be that the economy of scale has yet to have its full impact on reducing their cost. New ways to provide functional protein flows or concentrates may sharply reduce these costs without impairing product acceptance..

At the lowest level of sophitication are the defatted soy grits which are sanitary versions of food-grade by-products of soybean oil processing. These have been gaining food outlets in a variety of products, the most noteweworthy recent development being in the U.S. relief food mixture CSM (for corn/soy/milk). The concentrate, containing 50% prot ein or more, is readily available commercially at a cost of about 7¢ U.S. per pound thus making it a formidable competitor to other unconventional protein sources. Its high lysine content makes it particularly useful for nutritional supplementation of cereal foods.

Full-fat soy flours have had modest use for many years in infant formulas and baked goods. Recently the development of a low-cost cooking-extrusion process for their production foreshadows expanded use in a variety of foods, including beverages. The protein concentrates of protein 70's as they are called produced by leaching of raw defatted soy flakes with alcohol or with water at the isoelectric pH, are finding increasing food outlets, but principally in meat products. Lipoxidase-active soy-flours continue to be used, principally in England, as bread dough supplements. Specifically processed soy flours are gaining increasing use in this country as counterparts for dry skim milk in bread production.

Cottonseed Protein.

Cottonseed protein as an under-utilized edible resource is also not really new since it has been known in the U.S. for many years in terms of a well-standardized concentrate having a variety of specialized additive uses but in relatively small concentrations, for cookies, biscuits, crackers and doughnut applications. In parts of the southwestern U.S. another product of this type has been sold for many years as an ingredient of a specialty bread.

The unconventional aspect of cottonseed flour utilization probably emerged with the appearance of Incaparina in Guatemala. In this case the protein nutritive aspects were emphasized by the large proportion of cottonseed protein in the food formulation, in contrast to its minor use as an additive ingredient previously. The Incaparina commercial experience which has grown slowly but successfully in Colombia and Guatemala, has demonstrated that traditional processes for recovering oil as a primary product from cottonseed, can be modified to provide safe, nutritious and sanitary protein concentrates as well. The problem of adapting commercial screw presses or pre-press solvent extraction decilling methods for production of edible cottonseed concentrates lies in the careful control of heat which is required to bind or otherwise render biologically inactive the toxic polyphenolic pigment of this species, gossypol. Unfortunately, this can be accomplished only with a significant loss in protein nutritive value. This loss occurs because lysine is made nutritionally unavailable by chemical binding, principally to gossypol. Available lysine decreases from the norm (about 4.0 g. per 100 g. protein) by roughly 25% even in a

carefully processed product. Cottonseed protein, even with its lysine content intact or completely available, obviously has only modest nutritional supplementation value for cereal-cottonseed protein mixtures. In such cases, marked nutritional improvement can readily be achieved by adding synthetic lysine, or a lysine-rich concentrate such as soybean flour.

Use of these gossypol-inactivated cottonseed products in food mixtures at levels high enough to produce a meaningful nutritive impact is also limited by the strong yellow-green colour which they confer on such mixtures. Colour deteriorates even more markedly when such mixtures, usually with cereals, are heat-processed by cooking or steaming. I believe that this problem of colour has been the primary reason why we have not seen more rapid growth in the use of the heat-processed cotton seed flour in cereals or similar foods.

Much effort has been expended in the past 15 years to effectively and economically remove gossypol in the processing of cottonseed protein concentrates. In Sicily a feed-grade product has been produced for several years by means of acetone which serves also as the fat solvent. Some food-grade samples have been demonstrated, whose consistency has been questioned.

The Southern Regional Laboratory at the U.S. Department of Agriculture has been experimenting for many years with a solvent mixture of acetone, hexane and water to accomplish simultaneous low-temperature defatting and degossypolizing. Special oil refining techniques have been developed to cope with removal of the pigment from the oil. The protein concentrate made in this manner rivals soy protein in nutritional value, and indeed has been shown to be an excellent protein for infant feeding. Problems in

acetone degradation which cause undesirable flavours have delayed the full development of this promising technology.

Even more recently the USDA Southern Laboratory has been experimenting with a liquid cyclone technique, using hexane as the suspending medium to achieve physical removal of the intact gossypol pigment glands from cottonseed protein. Laboratory samples of these products, very light in colour, with protein contents of up to 70%, essentially undenatured and highly functional in character, have been demonstrated. This retention of functionality and high protein level suggests many applications in food including cereal products and beverages.

Of very great promise as a new protein source are glandless varieties of cottonseed which evolved from genetic studies initiated some 15 years ago. With pigment glands and thus gossypol virtually absent, there appear to be few problems in production of bland, light-coloured products of high nutritive value. The US National Cottonseed Products Association is carrying on an extension programme among farmers to stimulate glandless cottonseed production in the US. The group at the Southern Laboratory has been experimenting with the production of protein isolates from glandless cottonseed by alkali extraction as well as by air-classification methods. Possible applications to comminuted meat and in cereal products have been demonstrated. In contrast to soy protein isolates these cottonseed products appear to have major solubility at low pH, suggesting possibilities for application in acid-type beverages.

Peanut protein

Much has been written about peanut as a protein resource in India and several countries in Africa which are major producers. Actually, few problems appeared to stand in the way of production of edible heat-processed peanut protein concentrates by conventional oil milling equipment, until about 7 years ago when the aflatoxin problem was recognised. While many serious difficulties exist due to this factor, plans are moving ahead steadily in India to expand the food use of defatted peanut flour. When employed as a supplement to the traditional Indian 95% long extraction flour (atta) at levels between 6 and 10%, there appear to be no problems in the production and acceptability of the traditional unleavened flat bread (chapati). Indeed, the Central Food Technological Research Institute at Mysore has demonstrated increased palatability, due in part perhaps to the residual fat content of the expeller processed peanut product. This product is now being widely used in biscuits as well.

Commercial production of peanut protein isolate has also appeared in India, whose initial application will be as an extender of the liquid milk supply. This development is a logical outgrowth of what has been known in India as "toning" of milk. Buffalo milk, the principal market milk of India contains up to 8% butterfat. By adding dry skim milk to an equivalent level of the buffalo milk solids, and doubling the volume with water, the final solids content remains the same but the fat is reduced to half. The major urban milk conservation facilities in India provided by UNICEF and other agencies during the past 15 years are equipped for this practice.

However, with the recent extreme fluctuations in availability and costs of dry skim milk on the world market, and the scarcity of hard currency in India to purchase it, efforts are now under way to substitute as toning ingredients peanut protein isolate, and low dextrose-equivalent starch hydrolyzate as the carbohydrate source. This novel and logical development is analogous to the rapid increase in production and use in the US of so-calle "imitation" milks, except the nutritional quality is probably higher in the Indian toned product. With increasingly diffcult economics of milk production developing in the US and other industrialized countries, we may see a growing use of vegetable protein to extend bovine milk supplies in such countries. While sodium caseinate is the primary protein base of many current imitation milk products appearing in states such as California, Arizona and New York, soy protein isolate is also making its appearance in suct products.

Other new and interesting beverage-type products in this category are spray-dried combinations of cheese whey with soy protein which are becoming available to the cereal food industries. Presumably these products will find increasing use as pressure develops in industrialized countries to reduce stream pollution caused by cheese and dairy plants.

Although food-grade technology has not developed for the production of edible sesame, sunflowerseed and coconut proteins to the level of those available for edible soybean, cottonseed and peanut protein concentrates, nevertheless considerable progress is now evident in these areas as well.

Sesame is of particular interest nutritionally since for a plant protein it is unusually high in the sulfur-containing essential amino acid methionine. Its protein is therefore an excellent supplement to legume and soybean foods. Its traditional use as a food in the Middle East in the form of a paste called "tehina" is well known. This food is made from ground, non-defatted seeds which have been decorticated by alkali soaking, which is a relatively costly, labour-intensive process. Whole decorticated sesame is also widely used as a confection and as a decorative bread topping. Available processes for recovering defatted, low fibre protein concentrates are not adequately developed but engineering studies are in progress to develop a hopefully economical technology.

For many years efforts have been going on in the Philippines to defat fresh coconut in a manner which will provide the protein residue in an economical, nutritious and sanitary form. Very excellent prototype products have been available for several years and hopefully this technology too will soon be adequately perfected to permit production of commercially profitable products.

In conclusion it is clear that oilseed proteins in various nutritious and palatable forms have begun to make contributions to world protein needs. It seems virtually certain that these uses will increase markedly in the next few years.

BOOK REVIEW

LEARNING BETTER NUTRITION by Jean A. S. Ritchie - (published 1967, Food and Agriculture Organisation of the United Nations Rome).

This book is a unique and much needed contribution to the complex and relatively undeveloped field of applied nutrition. It is generally recognized that the bottleneck in this field is not so much what to do but how to get the people in the field to help themselves. The author portrays with imagination and accurate documentation the fascinating story of how this can be done.

Starting with a review of the broad problem of malnutrition, the social, cultural, economic and psychological influences are analysed, and the multifarious elements that must be considered in improving food production, supply and consumption are discussed with much realism and practicality. The author's deep understanding and wide experience of nutrition education and all it entails enables her to do an admirable job of training the sequential steps in establishing an upward spiral of better nutrition leading to more rapid economic growth, leading to still better nutrition.

(The last chapter recounting successful programmes reassures the reader that something can be done about improving the nutrition situation.)

The material in these chapters has been gathered from a wide variety of sources and includes much valuable information not readily available in concise form elsewhere.

. . . The illustrations are superbly depictive of the ideas they are intended to portray and are a welcome change from the type usually seen in textbooks.

The publication is a valuable resource book for anyone participating in a programme of applied nutrition. It should find wide usage in both graduate and undergraduate teaching for its appeal to a wide range of interests: the social, health, agricultural and food sciences, and also makes delightful reading simply for pleasure. For the out of school reader interested in food or people the book has much to offer.

The title is wisely chosen, and is a most befitting label on the concise material between the covers of this book.

CORRECTION OF ERROR

In the article "*What the Public Health Inspector could do to prevent malnutrition*" published in Cajanus No. 5 (October 1968) are two tables on pages 60 and 61 each of which contains an error, concerning the dilution of evaporated milk. These errors were repeated from the book "Child Nutrition in the Developing Countries" by D. B. Jelliffe from page 136 of which the tables were taken.

To dilute evaporated milk to a strength suitable for babies under three months one should add to one part of evaporated milk two parts of boiled water, *not three* as stated in the first table, third column. To dilute evaporated milk to a strength suitable for infants over three months (i.e. full strength) one should add to one part of evaporated milk only *one* part of boiled water and *not two* as stated in the second table.

We sincerely apologise for this potentially serious oversight, which had its origin in a printer's error and was not detected until too late for correction in Cajanus 6. The error has been corrected in the second edition of the book. The corrected tables read as follows:

TABLE I: SIMPLIFIED USE OF COW'S MILK AND ITS PREPARATIONS IN THE FEEDING OF BABIES UP TO THREE MONTHS OF AGE

Fresh Cow's Milk	Full Cream Powdered	Evaporated Milk
Dilution ... 2 parts boiled milk + 1 part boiled water	1 level teaspoon milk powder + 1 fluid ounce boiled water	1 part evaporated milk + 2 parts boiled water
Add sugar ... 1 level teaspoon household sugar per feeding		
Calculate Daily Volume - $2\frac{1}{2}$ fluid ounces per lb. body weight per day		
Calculate Volume per feed - One-fifth of daily total at each of five feedings at 4-hourly intervals		

TABLE II: SIMPLIFIED USE OF COW'S MILK AND ITS PREPARATION IN THE FEEDING OF INFANTS OVER THREE MONTHS OF AGE.

Fresh Cow's Milk	Full Cream Powdered Milk	Evaporated Milk
Dilution.... Undiluted boiled milk	1 rounded teaspoon milk + 1 fluid ounce boiled water	1 part evaporated milk + 1 part boiled water
Add Sugar ... 1 level teaspoonful household sugar per feeding		
Calculate Daily Volume		
Calculate Volume per feeding - One-fifth of daily total at each five feedings at 4-hourly intervals		

From "Child Nutrition in Developing Countries" by D. B. Jelliffe, US Government Printing Office, Washington D.C., 1968

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CONTENTS

THE "SURVIVING CHILD"

*MALNUTRITION AND INFECTIOUS DISEASES**

by

Jose M. Bengoa
Chief, Nutrition Section, WHO, Geneva

Introduction

The view that a good nutritional state increases resistance against infectious diseases has been generally accepted for many years, perhaps centuries, but the interaction (synergism or antagonism) between malnutrition and infection in its epidemiological complexity and public health signigicance was not fully recognized until recently.

In 1959, Scrimshaw, Taylor & Gordon (1) made an extensive review of the literature on the interaction of nutrition and infection, stressing that this inter-relationship is a dynamic process frequently characterized by synergism and less commonly by antagonism, and a very comprehensive WHO Monograph on the same subject is well advanced, also written by Scrimshaw, Taylor & Gordon**. Several other studies published recently will be mentioned in this paper.

The problem of interaction between nutrition and infection is of great importance for developing countries, not only from the epidemiological point

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* *This paper was presented at an international conference on Applied Microbiology, held in Addis Ababa, 6-11 November, 1967. Although it expands its subject on a world-wide basis, it is reproduced here because we feel that it deals with a concept of the greatest importance to the West Indies as well as elsewhere. Because of the nature of 'Cajanus', which is a newsletter rather than a specialised scientific journal, the list of references has been greatly reduced, from 66 to 16, but the Editor of 'Cajanus' will gladly supply a photocopy of both the article and the list of references to any person desirous of consulting them.*

** *Now published.* Interactions of Nutrition and Infection, *WHO Monograph No. 57, WHO, Geneva, 1968.*

of view, but also from the practical control viewpoint. It can be said that the association of malnutrition and infectious disease is the most common problem of disease in tropical and sub-tropical countries. They cannot be taken in isolation.

Vital statistics reflect the magnitude of the problem of infectious diseases and, to a much lesser degree, the problem of malnutrition, but they do not reflect the importance of the problem of the association of the two conditions. This association is the main explanation for the high mortality rates in children below five years of age. In some countries more than 50 percent of the total mortality occurs in children below five years, whilst in the more developed countries this figure is less than 10 per cent.

The period of greatest dietary inadequacy coincides, in general with increased exposure to an unsanitary environment and greater frequency of diarrhoeal diseases, measles, whooping cough and other diseases of early childhood. In comparison with rates from developed countries, the mortality rates from one to two years of age in developing countries are 20, 40 and even 100 times higher.

The observations on the seasonal variation of infectious diseases explain some facts. For instance, in West Africa, McGregor et al. (1967) (2) found poorer growth performance in the rainy season, which cannot be ascribed solely to dietary inadequacy. Food supplies become scarcer as the rains progress, but other important changes also occur. Infectious diseases, particularly those transmitted by insect vectors, are much commoner during the rains. McGregor et al thought that malnutrition, when it occurred, was more often the consequence than the cause of illness.

In addition, the interaction between malnutrition and infectious diseases is linked in turn with poor socio-economic circumstances. Such nutrition-infection interactions are apparent when low-income families live under very adverse conditions with very poor diets, small available living space and poor hygiene.

The present paper will not attempt to discuss the mechanisms through which the nutritional status affects the course of infections, nor the mechanisms through which infection may aggravate the nutritional status; these subjects are very well documented elsewhere, e.g. in the WHO monograph referred to earlier.

The purpose of this paper is to outline some epidemiological aspects of the interaction between nutrition and some infectious diseases. Four conditions have been selected in this review, namely: diarrhoea, measles, whooping cough and ascariasis. Other infectious diseases, such as malaria, tuberculosis, pneumonia, bronchitis, otitis, tonsilitis, etc. are also of great interest, but are not discussed here because of limited space.

The main emphasis here, however, will be the discussion of the effect in the life of the child of the accumulation of stresses - dietary and infectious - throughout the first years of life, which result in a "surviving child" with a physically, socially and perhaps mentally inharmonious development.

This paper will also discuss the question of immunization in malnourished children as well as the practical measures needed to control infectious diseases associated with malnutrition.

Diarrhoea

There is no doubt that the association between diarrhoea and malnutrition in young children is one of the most important and most common cases of interaction between malnutrition and infection. If in the first year of life mortality due to diarrhoea is about 100 times higher in developing countries than in technically advanced countries, in the one to four years age-group it may be as much as 150 or even 500 times higher. This disproportion is particularly more prevalent in the one to two years age-group. It has been very well documented by Gordon et al. in their studies of diarrhoea, especially of weaning diarrhoea, in developing countries. (3)(4).

It is also well known that outbreaks of diarrhoeal diseases are followed several weeks later by a sudden increase in the number of kwashiorkor cases. In Coonoor (India) it was pointed out that the peak incidence if kwashiorkor followed immediately after the maximum incidence of gastrointestinal disorders. In Guatemala and EL Salvador definite seasonal patterns are noted, the peak of hospital admissions or deaths from nutritional deficiency occurring two or three months after the peak noted for diarrhoeal diseases.

In an epidemiological study of acute diarrhoeal disease in three rural Guatemala villages, Gordon et al. (4) noted that the disease predominated in children between six months and two years old, i.e. during the period of weaning, and that the disease was relatively infrequent during the first six months of life, when children were mostly breast-fed. The incidence decreased sharply after two years, when weaning was completed.

This concentration of diarrhoeal cases during the weaning period has not been shown so precisely before because of the common practice in health statistics of considering all cases affecting infants up to one year as one group and of pooling all cases relating to children of one to four years as another group.

Gordon et al. found the same trend in death rates due to acute diarrhoea as in case incidence. In villages studied over a period of 10 years, it was in children in their second year of life that death rates were the highest (33.63 per 1000).

The figures for this age-group were twice that for infants in their first year. After the third year the rate dropped, to 9.6 per 1000 for subjects of five years. Although the number of children studied was relatively small, the results are very informative.

The weaning period thus appears as a crucial one in the growth of children. During the first months of life, while infants get breast milk, they make normal progress, but during the weaning process, which usually begins near six months of age and ends about the close of the second year, two main adverse influences play their part: initial experience with contaminated food after breast milk and intake of poorer and often insufficient food.

In the Guatemalan study, the frequency of acute diarrhoeal disease in children was directly related to the degree of malnutrition (according to Gomez's classification.(5)) It was found that the disease occurred with greater frequency in the malnourished than in the normal and that attack-rates increased progressively with the degree of malnutrition. For normal

infants under one year of age, the attack-rate was 86.6 cases per year and per 100 subjects, while for infants of the same age suffering from first-degree malnutrition, the figure was 242.6. For children of two and three years of age with first-degree malnutrition, the attack-rates were respectively 102.4 and 182.3, while the corresponding figures for children with second-degree malnutrition were 251.5 and 247.

In many instances, however, diarrhoea precedes (and is the precipitating factor in) malnutrition.

There is also evidence that in children with diarrhoea the length of hospitalization, the degree and type of dehydration and mortality are mainly determined by the nutritional status.

Endemic and sporadic diarrhoeal disease is transferred mainly by direct contact, hand-to-mouth infection, and in the Guatemalan regions which were studied most of the epidemics observed were spread in this way. Indirect contact and flies seem to play a far less important part.

In most of the developing countries, malnutrition and diarrhoea in young children are inseparable and no control programme can dissociate them.

Measles

Since the early observations on kwashiorkor, it has frequently been mentioned that measles is an important precipitating factor. The wasting that may occur after measles was also mentioned in the last century in England and has been reviewed by Morley et al.(6).

Table I gives mortality rates due to measles in some selected countries by age. The differences between developed and developing countries are striking, the mortality rate being several hundred times greater in some

developing countries than in the more industrialized countries.

These differences in mortality cannot be explained only by differences in medical care, nor by differences in the virulence of the virus.

It is well known that measles is contracted earlier in developing areas. In surveys carried out by Morley in several countries of west Africa, it was found that 50 per cent. of the children have had measles by the age of one year and eight months, and 75 per cent. by the age of two years and eight months. In England and Wales, only half of the children contracted measles by the age of four-and-a-half years.

Therefore, the influences of the age of the attack is of importance for better understanding of the differences in the mortality rate due to measles. In Chile, for instance, the highest mortality rate from measles occurs in children under one year of age and the rate falls by two-thirds between one and four years. However in Guatemala and in Mexico, the death rate is slightly higher in children in the one to four years age-group than in the first year. These facts are consistent with the pattern of malnutrition in these countries. In Chile, malnutrition is more frequent in the first year of life than in children of one to four years old.* In Guatemala, the reverse is the case, which may explain the above differences.

Viteri (personal communication), in studies recently carried out at INCAP, Guatemala, found that children with measles had decreases in nitrogen retention, and five out of 12 went into negative nitrogen balance. However,

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* *It seems that in the West Indies also the peak incidence of malnutrition is occurring at a much earlier age than it was, say, 15 years ago. - Editor.*

In addition to the stress of the infection itself (negative nitrogen balance), mention must be made of the frequency with which measles is accompanied by diarrhoea and the practice of giving a very restricted diet, including withholding milk or meat from the sick children. These facts explain the development of malnutrition after measles as well as the loss of weight during the period of measles. The question whether measles without diarrhoea may also precipitate severe malnutrition should be the object of further investigation.

Morley et al.(6) found in Nigeria that over a period of three years the fatality rate for measles was 25.3 per cent. They mention that other authors have reported rates of the order of 15 to 50 per cent. in west Africa. A more recent study, however, made in 1967 in west Africa, showed an over-all fatality rate of 12.3 per cent. Cantrelle in Senegal found an average fatality rate due to measles over three years in the order of eight to 17 per cent.

With regard to the loss of weight, Morley's study shows that one in four of the children lost more than 10 per cent. of their former weight as a result of measles. Debroise, Sy & Satge (7) in Senegal found that in more than one-third of the children with measles the loss of weight exceeded 10 per cent. and in 4.6 per cent. the loss exceeded 20 per cent. of the initial weight. It is evident that these children are prone to severe protein-calorie malnutrition soon afterwards, not only because of the effect of the infection but also because the erroneous therapeutic feeding practices and inadequate medical attention. Morley (20) mentions that in 16.3 per cent. of the children recorded in these surveys in west Africa, kwashiorkor developed subsequent to measles.

In Sierra Leone 37.5 per cent. of children hospitalized with kwashiorkor had had measles one to two months before. In Peru 25 per cent. of children with kwashiorkor had had measles within the two months prior to admission. In all cases food was cut off during the measles period and sometimes during convalescence.

In the coming years, owing to the use of vaccination against measles, a reduction in morbidity and mortality may be expected in many developing countries. This vaccination will not only reduce the prevalence and mortality from measles but will also probably reduce the number of children with severe malnutrition, particularly nutritional marasmus.

Whooping cough

Both morbidity and mortality from whooping cough continue to be high in developing countries. Reported morbidity from whooping cough (1959/1964) reached as much as 385 per 100 000 population in one country of Latin America, in contrast to only seven per 100 000 in a developed country.

Death rates are also high in many countries, particularly under one year of age (Table 1).

Morley et al. (8) have shown the significant loss of weight amongst children with whooping cough in Africa. One-quarter of the children took more than two, and some more than three, months to recover their weight. The loss of weight was not so severe in whooping cough as it was in measles, but the time taken to regain previous weight was similar in the two diseases. The authors conclude that "nutritional marasmus was more common than kwashiorkor as a sequel to whooping cough, particularly when it developed in the first few months of life."

Helminthic infection

The interaction of parasitic diseases, particularly ascariasis and malnutrition, is still a very controversial problem. Ascariasis and malnutrition are both highly prevalent in developing countries, and closely associated. Venkatachalam & Patwardhan (9) found a decrease of faecal nitrogen from 1.3 g to 0.7 g per day after deworming. Jelliffe reported a rapid rise in plasma proteins after deworming at comparable intake a malnourished child with a heavy infestation with ascariasis. Viteri (personal communication), however, has found that only very severe ascariasis infections produce a detectable effect on nitrogen balance.

Further studies are required on this extremely important problem.

Immunization and nutrition

An important chapter in the field of nutrition and infection is the effect of different types of vaccines in malnourished children.

This question includes the effect of the vaccine in worsening the nutritional state of children and the problem of the antibody response.

At INCAP (Guatemala), it was shown that smallpox vaccination caused a definitive drop in nitrogen retention in 10 out of 24 children recovering from severe malnutrition; seven of the children went into negative nitrogen balance.

However, Brown & Katz did not find any significant change of weight or of amino acid ratio following the smallpox vaccination in 54 malnourished children in Uganda.

With the innoculation by yellow fever vaccine of convalescent children, Gandra & Scrimshaw found that the nitrogen retention decreased, due mainly

to an increase in nitrogen excretion.

Brown and Katz found that the antibody response to the yellow fever antigen was markedly impaired in children deficient in protein. Only one out of the eight children with malnutrition had a positive result on the mouse protection test after vaccination.

In relation to measles vaccination, Viteri found a significant decrease in nitrogen retention in children vaccinated with attenuated live measles virus. One of them had a negative nitrogen balance and four a decrease in the level of serum vitamin A.

The report of the WHO Expert Committee in Nutrition and Infection[2] states that "in patients with kwashiorkor, immunization with TAB vaccines and administration of diphtheria toxoid generate little antibody; this situation corrects itself as treatment improves the nutritional state of the subject."

Observations of Kumate at the Hospital Infantil de Mexico have shown that 7-S.gamma-Z-globulin is reduced in severe malnutrition with average values in the malnourised children of about 400 mg/100 ml, as compared with 1000 mg/100 ml in well-nourished controls.

From the above it appears that the question of the effects of immunization on malnourished children is not yet completely clear, and further research is urgently required in view of the high prevalance of malnutrition in young children in developing countries which are at present expanding their immunization campaigns.

A few studies made in a limited number of subjects indicated, moreover, that some vaccines may have a limited antibody response in malnourished populations. However, for practical purposes, this should not preclude the

inclusion of children with mild-moderate malnutrition in immunization campaigns.

The surviving child

The synergistic effects of some infectious diseases and malnutrition have been briefly discussed in this paper. Each of these infectious diseases may produce an impairment of the nutritional status of children. Other diseases, such as malaria, hookworm, whipworm, tonsilitis, pharyngitis, otitis, respiratory diseases (bronchitis, pneumonia, tuberculosis, etc.), chickenpox, etc., may also have serious effects on the nutritional status of children.

However, the fact is that a given child in a given developing country passes, not only through one infectious disease, but through a series of them consecutively, or, sometimes, simultaneously. Another infection may well be contracted while the weight loss due to one infectious disease has not yet been regained. During the intervals between infections, but particularly during the infection, the child receives a diet poor in calories, proteins, and all basic nutrients. (Editors' italics)

These continuous stresses in children with marginal nutritional status may precipitate severe forms of malnutrition with frequent relapses, from which many of them die (the number depends upon the severity and the medical facilities available), but the majority survive. *Few of them, however, reach a complete nutritional rehabilitation* after hospital treatment of the severe condition if there is no follow-up and they remain in the community as chronic convalescents subject to a very poor diet and additional infectious stresses.

In breast-fed children the milk provides adequate nutrients for satisfactory health and growth, but between six months and three years the diet of the children in most of the developing countries is absolutely insufficient to cover the nutritional needs, particularly in proteins and calories. In the majority of cases, it is against this nutritional background, therefore, that the infectious diseases exert their severe influence, aggravating the already poor nutritional status of young children. In well-nourished children, most of the infectious diseases discussed in this paper produce very little mortality, and their effect on the nutritional status is negligible. However, the number of infectious diseases suffered by young children in developing countries is much higher than in developed countries or in higher income groups.

In a one-year follow-up study of children aged 0-3 years, in four different income groups Wittmann et al. in South Africa found that the average number of episodes of illnesses per child, mainly infectious diseases, was 5.8 per year in the lowest income group and 2.6 in the highest. Patwardhan et al. have found similar results in Jordon for a period of 12 months in breast-fed children.

Cravioto et al have found, in a careful longitudinal study of breast-fed children in Guatemala up to six months old, that 23 per cent. of them were sick for more than 20 per cent. of their lives (more than one month in six), while eight per cent. of them were sick for almost half of their lives. The situation of children under artificial feeding would have been worse. However, it is in children from six months to two years old that infectious diseases are still more frequent. This is well illustrated by the case

of a child from Guatemala which is by no means exceptional for children in Latin America. During the first two years of his life, this child passed through four episodes of conjunctivitis, seven of diarrhoea, eight of upper respiratory disease, two of thrush, two of stomatitis, one of bronchitis, one of measles, one of amigdalitis and one abscess. As a whole, 27 attacks of infectious diseases in 24 months! He was ill for 23 per cent. of his life, and, in addition it can be estimated that, for at least another equal period, he was not metabolically normal because he was recovering from a depletion occasioned by his illnesses.

Such a child with multiple dietary deficiencies associated with multiple infectious diseases in a short period of time is, if it survives, a living record of continuous environmental stresses, a relic of its dramatic early years of life.

This *surviving child*, grows, but at a very low rate. It is not rare to find children of this type in many communities with two, 3 or 4 years of physical retardation in relation to their chronological age, and possibly with mental impairment.

The child of six years, for example, who might look like a child of three years due to his retarded development, is in all possibility not comparable in his performance, in his psychology and learning behaviour, and perhaps in his biochemical parameters to a normal child of six years, but perhaps not to a normal child of three years either. He is another human being with his own bio-characteristics and his own behaviour.

Without going into details, which would be beyond the scope of this paper, the following quotations may be of interest.

Although undernutrition does not prevent some growth from going forward, "it *distorts* the normal symmetry of size and body proportion and modifies the usual ratio between bio-chemical maturation and chronological age" (Cravioto et al.).

"*Perversion* of development in human beings subjected to chronic malnutrition for many years will scarcely be questioned" (Gillman & Gillman).

"Malnutrition produces a *disharmonic* and retarded development" (Viniegra et al.)

Jelliffe (42) states that the clinical picture of mild-moderate protein-calorie malnutrition is of an under-weight *disproportionate child*, with a long-seeming body, thin limbs, a head that appears too large, and feet that seem unduly elongated.

Scroggie et al. point out "the lack of balanced growth, as shown by the supra/infraumbilical and cranial/toraxic circumference index". They suggest that in this *unbalanced growth*, endocrine factors may be involved, they themselves affected by the existing malnutrition.

These expressions (distortion, perversion, disharmony, disproportion and unbalanced growth), underlined by us, give a clear idea that malnutrition may cause not only simple retardation but also disharmonic development.

Apparently this question has not been well studied, and it may deserve more careful attention because of the increased number of "surviving children" due to the decrease in mortality rates.

This state of affairs is very difficult to overcome, because of the adapted physical (weight/height ratio) balance already established. Some damages may be irreversible, particularly if malnutrition affects the child

in his early months of life (Cravioto et al. (34)).

Graham and Morales have stated that it is all too frequent in Peru to encounter adults who are 135 cm tall or less and whose mental age does not exceed 10 or 12 years. The authors do not mention whether this is due only to malnutrition or whether some genetic or other factors also intervened. But the fact in itself is impressive.

Among the "surviving children", some of them would be classified as examples of "nutritional dwarfing" (Jelliffe & Jelliffe; (11) Downs (12)) others of "growth retardation", and others simply as "apparently healthy children". However, the 'surviving child" is understood here more in the social context, as a "syndrome of social deprivation", (Ramos-Galvan) than as a medical entity.

Further studies of this problem and an attempt to classify the different types of "surviving children", particularly according to the degree of the irreversibility and importance of the damages, are urgently required. This problem may be of more importance in countries where some significant reduction in mortality rates in infants and young children has already been obtained, but at the same time little improvement in the nutritional and social conditions has become apparent.

In some areas, as Oomen has shown for the Papuan child, the conditions of life of the survivors do not seem to interfere much with their vitality, and their chances of further survival do not appear too bad.
This may be the case for areas where infant mortality (150-300 per 1000 new-born) and young children mortality are very high, since there is then some kind of selection of the survivors. But in Latin America and other areas

where infant and young children mortalities have been considerably reduced in the last years the condition of the handicapped survivors is becoming of greater social importance, even if the risk of death is no longer so great.

There are no clear reasons, for instance, why only 10 per cent. of children in Latin America who start school at the age of six or seven years, finish their primary education. It is difficult to accept that it is mainly due to the pressure of the parents who wish the children to work on the farm or because of lack of schools. There are probably reasons for failure which come from earlier years - namely, the existence of "surviving children", not completely rehabilitated from the nutritional point of view. The importance of this problem is very well stated in a document prepared by the WHO Regional Office for Africa: "To save the lives of these children, and to prevent those who survive from carrying the permanent stigma of a sub-standard or abnormal development should be, for years to come, one of the many areas of endeavour towards which our priority efforts should be directed." A recent paper Pek Hien Liang *et al* indicate that, in a group of Indonesian children aged five to 12 years whose early nutritional history and nutritional state 6 years prior to the study were known, "it was found that the intellectual development (of these children) as well as their physical development could be predicted with a high degree of accuracy on the basis of their nutritional status during the pre-school years."

Practical preventive measures

It is clear from the above that the problems due to the interaction of malnutrition and infection should be attacked simultaneously by both nutrition and communicable disease control programmes.

Since the major problem concerns infants and young children, maternal and child health activities are logically in the best position to integrate the programmes mentioned above. In a previous paper (Bengoa, 1965) the programmes directed to the prevention of malnutrition in young children were discussed in some detail, and, therefore, only those activities dealing with the interaction of malnutrition and infection will be outlined here.

As in any other public health problem, two levels of action may be considered: (a) general measures or primary prevention, and (b) specific preventive programmes.

(a) Among the general measures, the increase of food production is of paramount importance. Because of the high rate of population growth, the world-wide food production *per capita* has been decreasing during recent years, and intensive efforts should be made to improve the present situation.

To increase the income of the families and the capacity to earn such an income is also of fundamental importance, because, as has been shown by Wittmann et al. there is a clear association between the number of infectious diseases and the nutritional status on the one hand and the income of the families on the other.

Environmental sanitation, particularly water supply, is also a programme which deserves high priority, especially in dealing with the control of diarrhoea.

Health education of the public, in the broader sense, should also be one of the key points of action at national and at community level. As a framework of all the above basic activities, a progressive improvement of standards

of living and other socio-economic conditions must be considered the final aim of our efforts.

However, bearing in mind the above, and realizing its importance, more specific and immediate action can and should be undertaken with a view to reducing the present enormous problem.

(b) The main objectives of the specific programmes directed at the reduction of the effects of the synergism between malnutrition and infection may be classified as follows:

1. maintenance of good nutritional status of young children, and hence a good resistance against infection;
2. reduction of the prevalence of infectious diseases;
3. minimizing the effects of infectious diseases on the nutritional status of children, and reducing mortality;
4. an early and complete nutritional rehabilitation of malnourished children.

In view of the large number of activities which can be enumerated under the above sub-headings, mention will only be made here of the most important among them.

1. Maintenance of good nutritional status

Optimal maternal diet during pregnancy, prolonged breast-feeding, progressive weaning with appropriate foods and education of mothers on infant-feeding practices are the basis for the maintenance of good nutritional status in children. All these aspects are very well covered in the *WHO monograph* entitled "Infant nutrition in the subtropics and tropics" by Jelliffe.

In connection with breast-feeding, an intensification of efforts to avoid or at least to decelerate the trends of early weaning which is becoming a normal practice in many developing countries is urgently required. Without going into the reasons for this trend, it appears that it is and will be the most formidable barrier to maintaining a good nutritional status of children in developing countries in the first period of their life.

Associated with good breast-feeding practices, appropriate weaning foods rich in proteins should be available at low cost, in order to make a satisfactory transition between breast-feeding and family diet. A recent review of this subject has been made by DeMaeyer.

In spite of the slow progress in the development and particularly in the promotion of unconventional weaning foods, and in general protein-enriched cereal foods, they probably constitute the greatest hope for the prevention of malnutrition and for nutritional rehabilitation of malnourished children. It will not be easy to introduce these products in the young child's diet through commercial channels, but in many areas it will perhaps be more difficult to place the conventional protein-rich foods (milk, eggs, etc.) in such a diet. Efforts in both directions should be encouraged, however, because they are not incompatible, but complementary.

With these measures, the child will be better prepared to confront the attack of infections with the necessary resistance to minimize their effects.

2. Reduction of the prevalence of infectious diseases

First of all, immunizations should be carried out as part of a wider programme. Cook in his pre-school protection programme in Ankole, Uganda,

has shown the results of an intensified immunization programme in circumstances similar to most of the developing countries.

In addition, and particularly in relation to the diarrhoea problem, more attention should be given to the management of foods at home and personal hygiene. The studies of Gordon et al. mentioned above show how important is direct contact and hand-to-mouth infection in epidemic and sporadic diarrhoeal disease. In this context, the great importance of health education, with emphasis on hygienic handling of foods, should be stressed. General sanitation measures have already been mentioned.

3. *Minimizing the effects of infectious diseases*

The activities related to this aim may consist in the early treatment of all infectious diseases, particularly those which may have a long and severe outcome without treatment. This is the case with diarrhoea in young children. Programmes of oral rehydration carried out by auxiliary personnel, under medical supervision, have been proved to be highly satisfactory in Venezuela. Fluid therapy by intragastric drip in dehydrated children has also given good results, as shown by Payet.

The results of Wilkinson in Sierra Leone have demonstrated the effectiveness of a programme of prevention and treatment of malnutrition linked with the prevention and treatment of infectious diseases.

One of the most important aspects under this sub-heading from the nutritional point of view is the question of appropriate diet during the course of infectious diseases. One of the main reasons for the repercussion of infections on the nutritional status, in addition to anorexia, negative

nitrogen balance and other factors, is the practice of imposing a drastically reduced diet on sick children. Although its importance has been recognized everywhere, very little has been done to overcome the situation. In some special circumstances, as in widespread epidemics of infectious diseases, the possibilities of organizing and *ad hoc* programme of food distribution to the affected children at the community level could also be considered. This has been done occasionally with good results.

The question of worming, particularly in the case of ascariasis, should also be considered, particularly in cases of a heavy infestation.

In general, three approaches to ascariasis control have proved valuable; (1) the treatment of infected populations; (2) measures to prevent environmental contamination with human faeces; and (3) education of the public in personal hygiene. In the most successful programmes, all three measures have been undertaken simultaneously.

The organizational aspects of ascariasis control are well covered in the recent report of a WHO Expert Committee on this subject.

4. An early and complete nutritional rehabilitation of malnourished childhood.

Even after all the above specific preventive measures have been implemented to a reasonable degree - to which high priority should be given - the existence of a number of malnourished children requiring prompt nutritional rehabilitation will, for the time being, be unavoidable. It is probably at this stage that the problem has been tackled least satisfactorily, and this is perhaps the main explanation of the great proportion of "surviving children" with partially irreversible damage. Children may have been well treated

during their episodes of diarrhoea, measles, whooping cough, etc., but little attention is given to the fact that these children have lost some percentage of their previous weight during the infectious process. In other cases, children on a very poor diet are diminishing progressively in weight, or are not progressing as should be expected, but they are not recognized by the parents and in the outpatient clinics as persons who require prompt action in order to avoid further deterioration of their nutritional status. This is one important cause of the deplorable situation of the "surviving child".

The nutritional rehabilitation of already malnourished children is difficult to achieve at home by means of the "normal" family diet, or advice to the mothers alone; a "rehabilitation diet" is required, which should be of greater nutritional value than the normal diet, particularly in calories and proteins, and should comprise three or four meals daily.

Some countries (including Algeria, Colombia, Ecuador, Guatemala, Haiti and Venezuela) have already organized nutritional rehabilitation centres, aimed at achieving quick results in the rehabilitation of malnourished children and educating the mothers simultaneously. The organization, advantages and limitations of such centres have been the object of reports from Romero Romero and Beghin et al. and have recently been reviewed by Bengoa.(15) Preliminary reports show that the results are very satisfactory.

One relevant and important question is whether it is possible to improve the situation once the "surviving child" has reached a state of equilibrium and is physically adapted. The answer to this is given by some experience obtained in nutritional rehabilitation centres. In contrast to the quick

and full nutritional rehabilitation of children with acute or recent manifestations of under-nutrition, the growth of some children (even with a large intake of calories, proteins and other essential nutrients) is sometimes very slow. It is not clear whether, in spite of the slow progress in growth of some of these "surviving children", there are not some favourable changes in their body composition, as should be expected. The fact is that even children classified as having third-degree malnutriiton according to the Gomez classification show little apparent physical improvement after months of a satisfactory diet. They have already reached a state of almost irreversible adapted physical equilibrium. The animal experiments done by Lister & McCance confirm what is said above: "There is no doubt", state these authors, "that, if animals are subject to a period of undernutrition severe enough and early enough in their development they do not attain the full size attained for them by nature - even if they are given unlimited amounts of good food thereafter."

However, it is of interest to point out that in the already physically adapted children a striking improvement has been observed in the field of psychomotor activity, effectivity, emotional and social-personal development, or, in other words, the feeling of happiness (Cravioto, Mexico; De Leon, Guatemala; Raoult, Algeria - personal communications). It seems that the psycho-social disharmony typical of many "surviving children" gives way to a more harmonious and balanced development. This evident improvement alone will amply justify the nutritional rehabilitation of such children.

Rueda-Williamson suggests that mental development should be included in the evaluation of nutritional rehabilitation programmes.

It is possible, and perhaps necessary, to envisage other methods (such as those suggested by Gyorgy, for example) to cover wider groups of "surviving children", but the principle remains in the prompt and complete nutritional rehabilitation of early malnourished children, associated with the education of the mothers. The programme carried out in Colombia, a very comprehensive one, is a good example.

It is unfortunate that one still needs to think in terms of rehabilitation programmes to reverse in some degree the damage already done. For obvious human, technical and financial reasons the highest priority has to be given to the three previous objectives, particularly to the first one, namely, *the maintenance of a good nutritional status in the first years of life, which is the core of the whole problem.* If this objective is attained, successive attacks of most infectious diseases of moderate virulence will probably produce no more than mild effects, which may be easily overcome. Once the second and third objectives are attained, there will be, in addition, a considerable reduction of infections and of their damage to nutritional status. The programmes of nutritional rehabilitation have to be considered only in the light of the results obtained in reaching the previous objectives, which at the present time are far from satisfactory. Hospitals have at present to contend with enormous financial burdens in dealing with a population already malnourished, where mortality rates are very high. The survivors remain in the community impairing the life of the present generation and also,

in some degree, the destiny of the next generation.

In practice, all the above objectives have necessarily to be considered simultaneously, since at a given moment in a community there may be found children who require prompt action at different levles of prevention, treatment of nutritional rehabilitation. In many areas where malnutrition is highly prevalent, immediate attention should be given to obtain complete nutritional rehabilitation of malnourished children, while for the newly-born highest priority should be given to the first objectives indicated above. A very interesting approach has been suggested by Morley et al. who have selected some "indications for special care" which allow the establishment of priorities in the prevention of malnutrition in young children.

It is true that the final and permanent answer to the problem will rest in raising the standard of living of the population within the social ahd economic development; it is doubtful, however, that such development w would be fully successful without taking into account the need for the nutritional improvement of the present generation.

As a matter of fact, prevention of diseases and promotion of health can no longer be considered as an expenditure, but as an important, perhaps essential, investment. It is within this context that a definitive solution will be found for the "surviving child".

TABLE I. MORTALITY FROM GASTRO-ENTERITIS; MEASLES AND WHOOPING-COUGH, FOR CHILDREN UNDER FIVE YEARS[a]

	Gastro-enteritis, 1964[b]		Measles, average 1963-1964		Whooping Cough, 1964	
	under 1 year rate per 100 000 live-born	1-4 years rate per 100 000 population	under 1 year rate per 100 000 live-born	1-4 years rate per 100 000 population	under 1 year rate per 100 000 live-born	1-4 years rate per 100 000 population
Austria	139.0	6.8	4.5	2.2	2.2	1.0
Denmark	40.8	1.7	-	1.0	2.4	0.3
Sweden	13.0	1.4	-	-	-	-
United Kingdom: England and Wales	42.0	3.5	2.1	1.5	3.7	0.3
Chile	1 588.0	69.3	413.2	137.6	68.3	8.1
Colombia	1 480.4	278.4	61.9	48.8	191.2	52.8
Guatemala	1 275.9[c]	704.2[c]	248.0[d]	310.0[d]	589.4[c]	309.2[c]
Mauritius	1 380.3	203.2	1.8	-	3.6	-
Mexico	1 224.0	267.4	71.0	103.7	112.7	75.8
Philippines	521.0	149 6	58.4	25.6	12.3	2.6
Venezuela	714.7	89.8	24.2	21.9	53.6	15.2

(a) From National and WHO International Reports.

(b) Gastritis, duodenitis, enteritis, and colitis, except diarrhoea of the newborn (B36).

(c) 1963

(d) Average 1962-1963.

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NUTRITION NEWS AND OPINION FROM THE CARIBBEAN

JAMAICA'S BIRTH RATE FALLS FROM 39.9/1000 IN 1966 TO 34.2/1000 IN 1968 - From the 'Daily Gleaner - 27 March 1969.

The Birthrate in Jamaica has fallen from 35.9 per 1,000 of the population in 1967 to 34.2 in 1968, which represents a further decline from the 1966 figure, which was 39.9

This was announced by the Minister of Health, the Hon. Dr. Herbert Eldemire, speaking at the official opening of the new Stony Hill Health Centre on Tuesday afternoon. This was the 120th centre to be established by the National Family Planning Board and represents an achievement of its target.

Dr. Eldemire said there was no a growing appreciation of and further commitment of the family planning programme; there was a craving for more information, a demand for constant examination of the work, so as to ensure that the best was offered to each individual.

The Minister recalled that when he opened the new Savanna-la-mar Hospital in 1964, he announced his commitment to the provision of family planning services within the ambit of the island's Health Services offered by his Ministry.

Provisional board

In September, 1967, following clinical research and the efforts of voluntary organizations he appointed the provisional National Family Planning Board to take swift and decisive action to extend the work of the former Family Planning Unit which was set up in June, 1966, as a direct division of the Ministry of Health.

The new Board was then empowered to present a national porgramme on the subject; the programme would be carried out through co-ordinated action and planning with support of both non-government and government agencies.

In December, 1966, there were only 25 Family Planning Centres; in December, 1967, there were 54.

"Today I am pleased to announce that we are in a position where family planning services are being offered at 120 places throughout Jamaica" he declared.

This included the services offered in hospitals, health centres and clinics of the Jamaica Family Planning Association, and we have begun a breakthrough into the industrial sector. This has been a challenge to each individual and organization concerned with the population explosion here and the welfare of the country. We can now, all of us, share the credit of the magnificent step forward."

The Minister said, however, that he regarded all that as just the beginning of a programme which he believed could contribute substantially to the strength of the Jamaican nation. He was further encouraged by the fact that there were in the community parents who really cared and were concerned about the future welfare of their children.

Unsung promotions

Pointing out that there were many unsung promoters of family welfare in Jamaica, Dr. Eldemire said congratulations were theirs as also those workers in the administrative and educational network. A team of more than 600 persons, he said, had been deployed in the administration and provision of family planning services, and these included members of his Ministry, the

National Family Planning Board, physicians, nurses and other para-medical personnel.

Although no particular parish could be singled out, he said, for special achievement credit, he wished, nevertheless, to pay tribute to the Kingston and St. Andrew area and to thank the promoters for attaining the 120th-centre target before March 31, this year, as was planned. He also thanked them for affording him the pleasure of declaring the (Stony Hill) centre open.

The official opening ceremony was presided over by the Acting Chairman of the Board, Sir John Mordecai, who made the introductory remarks and introduced the Minister and other speakers. Among these were the Director of the National Family Planning Board, Dr. Lenworth Jacobs, and the Medical Officer (Health) for the Corporate Area, Dr. O. F. Warner.

Dr. Jacobs said that he programme had now created a new and acceptable concept of family planning throughout Jamaica; clinics were opened in strategic spots where population density was heavy; it was his hope, therefore, that as years went by, the birth-rate would drop to about 20 per 1,000 in Jamaica.

110 TONS OF NEW HYBRID SEED CORN FOR EXPORT
From the 'Daily Gleaner', Jamaica, 25 January 1969.

The Pioneer Hi-Bred Corn Company's Tropical Research Station at Caymanas Estate, St.Catherine, has received overseas orders for 110 tons of new variety of hybrid seed corn developed at the station. Orders are from Central American and Caribbean countries, and shipment of the grain will start about the middle of this month.

Seed corn for export has been obtained from the 200 acres of land on Caymanas Estate planted last autumn. Previously, the Caymanas venture produced consumer's corn for the local market, but a switch-over was made last autumn because of the greater commercial potential of seed corn.

The preparations for export were disclosed yesterday by Dr. Surinder M. Sehgal, head of the US-based company's operations at Caymanas Estate. Dr. Sehgal admitted to having 150 tons altogether, but said that 40 tons are being held back for local farmers.

Dr. Sehgal said this is the first time he will be exporting hybrid seed corn in commercial quantities. He formerly exported small quantities for experimental purposes.

Very good results

The big bookings, he said, came after extensive testing of the hybrid seed corn was seen to produce very good results. For apart from high yielding capacity, the new varieties of hybrid seed corn also showed a very high degree of resistance to the maize dwarf mosaic disease which has proven fatal to the varieties of corn currently grown in Central American and Caribbean countries.

There have been orders of 50 tons from El Salavador, 15 tons from Costa Rica, and two tons from Honduras, as well as orders totalling 50 tons from Guyana, Trinidad, Barbados, Dominica, Haiti and Surinam, Sehgal said.

He also said that the demand for the hybrid seed corn was greater than he could meet, and his company planned to expand its operations but was finding it difficult to obtain additional lands suitable for production of this variety of seed corn.

Dr. Sehgal now has 200 acres of land on which he carries out commercial as well as research work at Caymanas.

PROTEIN VALUE IN CORN IMPROVED -
From the 'Daily Gleaner', Jamaica, 25 January 1969

AN article in the *Farmers' Weekly* of the 21st suggested that farmers should endeavour to grow their own corn. With the present accent on livestock production and improvement and the extremely high prices of most foodstuffs this is good advice indeed.

What are the possible developments in corn, and how will they affect the farmer? For the answer we can take a peep into research periscope.

One very promising lead being followed in corn research is the development of a vastly improved protein quality in corn. In 1963, scientists at Purdue University in the United States found something that seemed to suggest that the protein quality of corn could be greatly improved. . . This

corn was called a high Lysine corn - Lysine being one of the essential amino acids that go to build a good quality protein. One of the main reasons that animal proteins are generally more efficient than proteins from plant sources is that plant proteins are generally deficient in the essential amino acids.

The new type of corn has been found to be three times as efficient as normal corn in some animal feeds and twice as efficient in some human diets. The new corn therefore, could have tremendous impact not only on the livestock industry of the world but also on the human diets of millions who are protein-hungry at present.

Late in 1963, the scientists at Purdue University were testing the amino acid patterns of several strains of corn, when one called Opaque-2 showed an unusual high amino acid balance. It contained more level of Lysine and substantially more Tryptophan, another essential amino acid, than the others being tested.

Potential

The potential of the corn was first tested on white rats. Those fed on high Lysine corn grew three times as fast, ate twice as much food and developed smoother hair coats then did those fed on ordinary corn. In 1966, tests were carried out on swine. Weanling pigs were fed the corn plus minerals and vitamins. They gained weight 3.6 times faster then pigs fed on regular corn. With its better protein, high Lysine corn did not require the usual protein supplements necessary when regular corn is used, when fed to finishing hogs.

The corn was next tested on children in Guatemala. Here it was found that the protein quality was equal to that in milk. Additional tests at Purdue University supported this finding.

Research into the development of this high Lysine corn is continuing at accelerated pace. Attempts are being made to breed into the high Lysine corn not only the potential to produce a better quality protein but all the other qualities that make hybrid corn so important to world agriculture.

Another research effort, currently being centred at Iowa State University in the United States, is the production of the two-ear corn. In tests carried out so far, it has been found that the combined production of the two-ear consistently exceeded that of the one eared corn. This is not expected to be of such great importance where conditions are ideal as when there is an adverse weather condition. Whereas in dry seasons there may be a great increase in barren stalks in a given field of corn, the two-ear corn is found to give much less percentage of barren stalks. The ears will be reduced in size if the weather is dry but the grain yield is consistently more than the single earned corn. In seasons where the weather conditions are ideal, the two-eared corn produce a larger crop also.

EXPERIMENTS TO INCREASE PROTEINS IN RICE -
From the 'Trinidad Guardian' 10 January 1969.

JAPAN'S Ministry of Agriculture and Forestry through its organs, the Radiation Plant Breeding Farm and the Food Research Institute recently revealed it had concluded irradiation of rice plants,can produce rice with twice as much protein content as that of present species.

Probably, it was the axiom that the world will enter a period of acute food shortage sooner or later, because of the rapid pace of population expansion and the present rate of agriculture production growth. In particular there are indications which point to a dire shortage of protein.

If this "high-protein rice" is produced on a commercial scale, rice can also become an important source of protein like meat and fish.

This discovery is of great significance for the rice-eating Japanese people from the view points of both nourishment and national economy.

The rice has been developed at the Agriculture-Forestry Ministry's Radiation Plant Breeding Farm, located in Omiya, some 15 miles north of Mito, Ibraki Prefecture (75 miles northeast of Tokyo). The farm has a gamma field to study plant breeding by means of irradiation.

The plants are irradiated with gamma rays night and day except for four hours for weeding and fertilizing in the morning. The cobalt 60 in the irradiation tower, emitting 3,000 curies of radio-activity, is remote-controlled from a room about 100 yards away to prevent the radiation from endangering the health of human beings.

To keep gamma rays from leaking out of the farm the gamma field is surrounded by a 26-foot-high bank. In addition off-limits, zones and non-habitation areas are set up outside the bank.

The Omiya Gamma Field built in 1960, has had some remarkable achievements. Among typical examples are rice plants with a short stem, which do not fall even in strong wind; rice plants which produce a larger amount of rice grains; and mulberry trees with leaves 30% broader then those of conventional varieties. The radioactive farm has also successfully developed peach trees with fruit ripening a week earlier than in the past.

70 Varieties

Naturally, the "high-protein rice" plants have been grown at this experimental farm. Mr. Yukihiko Tanaka and other experts of the farm planted several hundred varieties of rice plants from 1962 to 1963, and exposed them to gamma rays for 20 hours a day during the whole period of their growth.

This produced diverse mutations, such as short-stem rice plants and circular rice grains. The experiment even evolved rice plants which grew in a prostrate condition.

About 70 varieties of rice, harvested from these mutants were tested by the amino acid analyser at the Food Research Institute of the Agriculture-Forestry Ministry in February to measure their protein content.

This confirmed that the fourth, fifth and 177th rice planted since the start of the experiment in 1962 - all of the "Norin No.8" variety - contained unusually high percentages of protein.

The original "Norin No. 8" rice contains 5.5 grams of protein per 100 grains. By contrast, No. 4 Rice contained 10.2 grams No.5 Rice 9.5 to 11.3

grams and No. 177 Rice 8.9 grams - that is, 1.5 two times as much proteins as that of the original "Norin No. 8".

Moreover of the three mutants No. 4 and No. 5 were found to ripen earlier than usual. The ears formed about "Norin 8" . The two mutants, therefore, are fit for two crop farming.

Five or six years hence, these mutant rice plants will be improved and become fixed varieties, and their seeds will be distributed to farmers in general under the Government's rice-improving programme.

The day is not too distant when "high-protein" will be used for the daily meals for the Japanese people.

Since there is a limit to seeking protein form animal products the world will have to undertake the utilisation of vegetable protein on a grand scale.

Great expectations are placed on the emergence of "high-protein rice" to make a great contribution to the nourishment of people all over the world.

AGRICULTURE YEAR - NUTRITION DRIVE URGED -
From the "Trinidad Guardian" 29 December 1969 - by Eric Roach .

The Government, the farmers and the nation must be fully aware of the necessity to increase the production and consumption of protein foods.

Growing more food is valueless, if the right sort of food is not grown and if the valuable protein-rich foods are priced out of the pockets of the average citizen.

If the nation is, in fact, to benefit from the grow more food and eat local campaigns, meat, milk, eggs, and grain legumes should be produced cheaper than they are at the present time.

They can become cheaper if larger quantities are produced at cheaper rates and if people are taught, for their own good health, to eat more nutritious proteins and less of starches.

A nutrition campaign should be another of the tasks of Agriculture Year.

DAILY FOOD FOR DOMINICAN FAMILIES

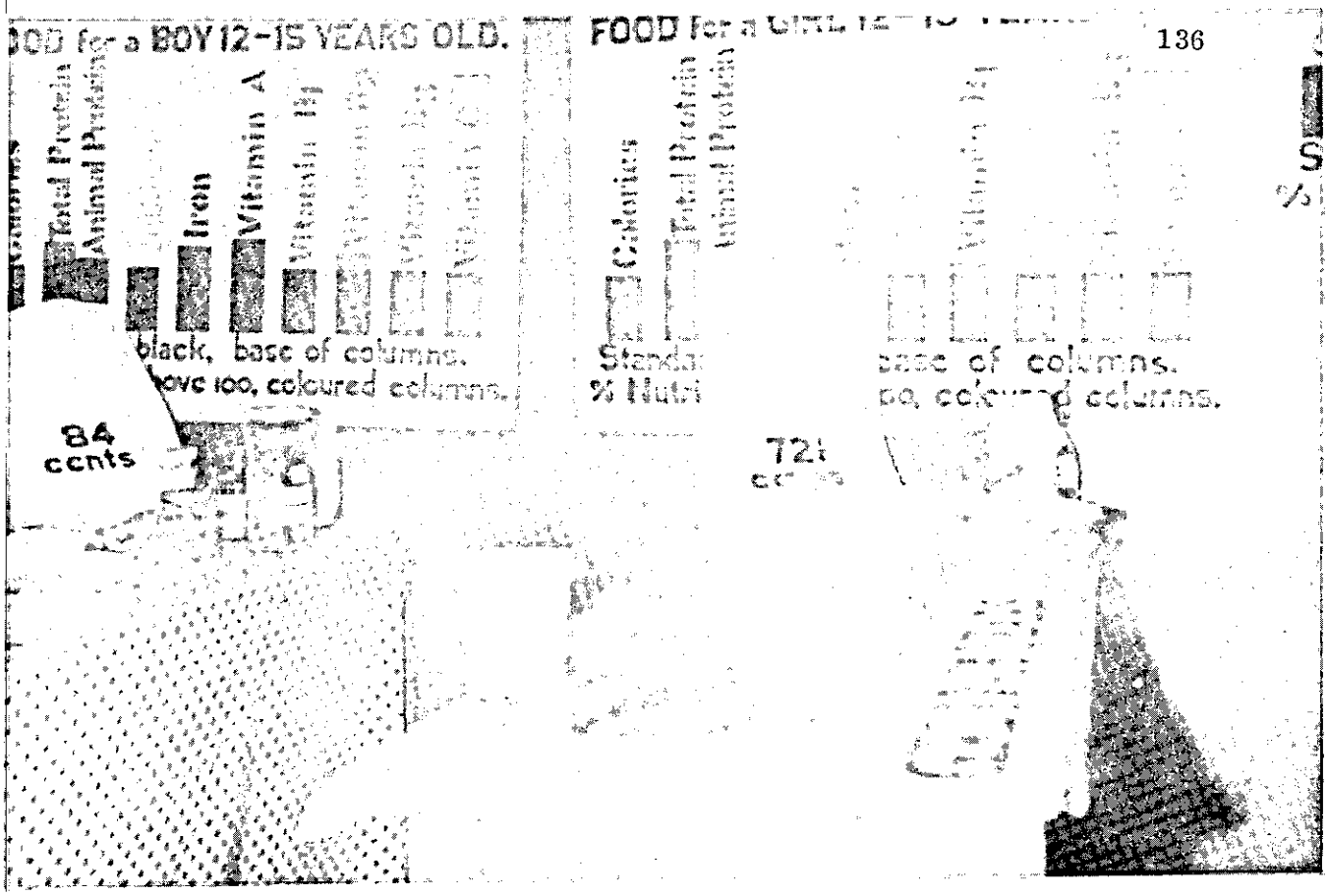
by

Miss Deen Low, PAHO/WHO Public Health Nutritionist, Dominica.

Daily Food for Dominican Families was the title and theme of a nutrition booth at a 4-day Agricultural Fair held in the Botanic Gardens, Roseau, Dominica from October 24th through the 27th. The booth was organized by the Home Economics National Nutrition Association (HENNA) and supported by the Ministry of Education, Health and Social Services.

HENNA came into being as an outcome of a workshop seminar held in April 1968, for a group of women interested in the nutrition educational aspects of Home Economics. HENNA has a membership of over 20. It meets every two months and its members are kept in touch with each other on matters of interest in Home Economics and Nutrition by a newsletter sent out about every six weeks.

At. HENNA'S booth there were exhibited meals for various members of a Dominican family. These started with 3, 6, 9, 12 months old babies, with tables set for a 2 to 4-year old child, a 6 to 9-year old school child, for an adolescent boy and girl, 12 to 15 years old. The man of the family was not neglected, nor was the woman. The meals of the latter were adjusted to meet the needs of pregnancy and lactation. At the back of each table were displayed jars and containers with the precise amount of foods used in the meals before being cooked.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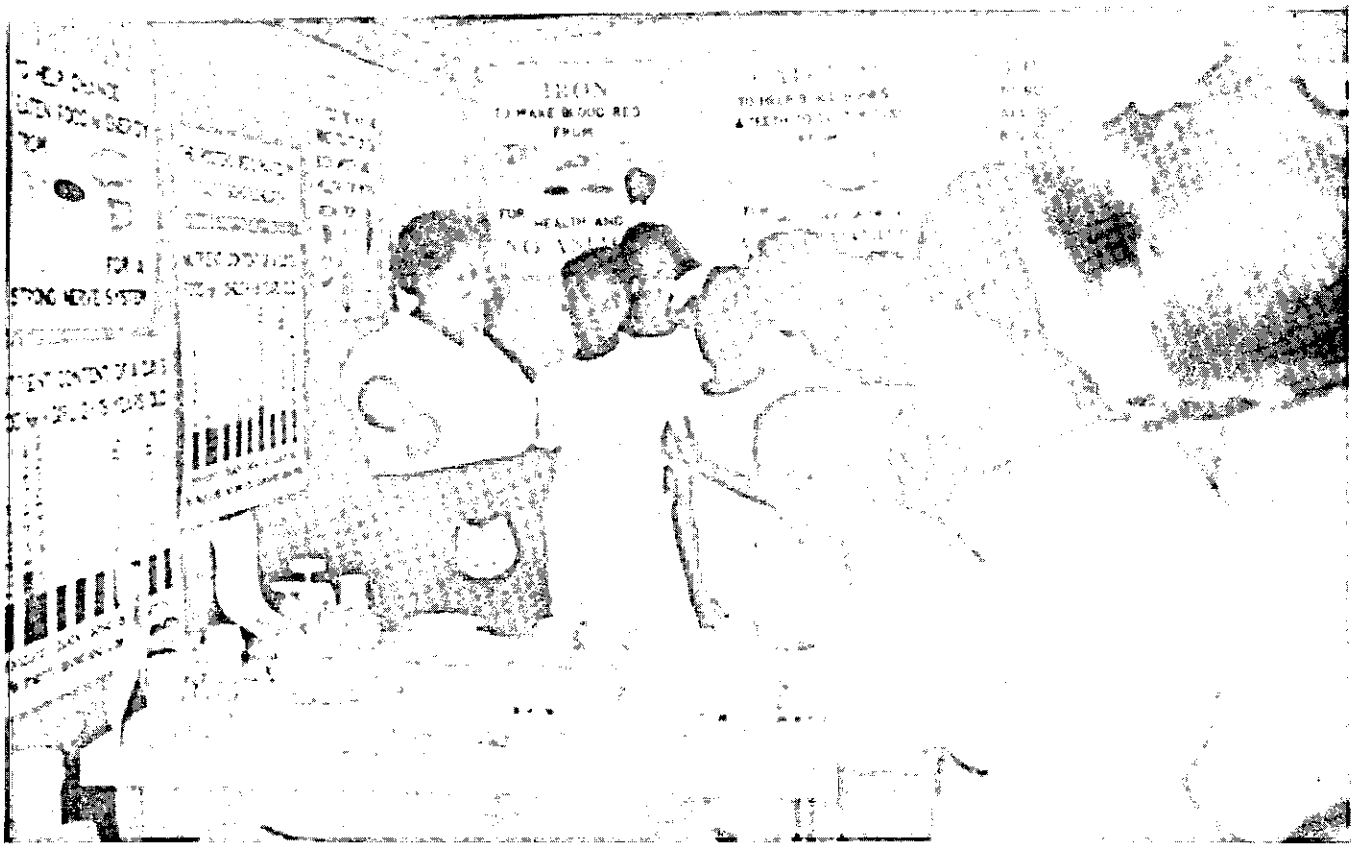
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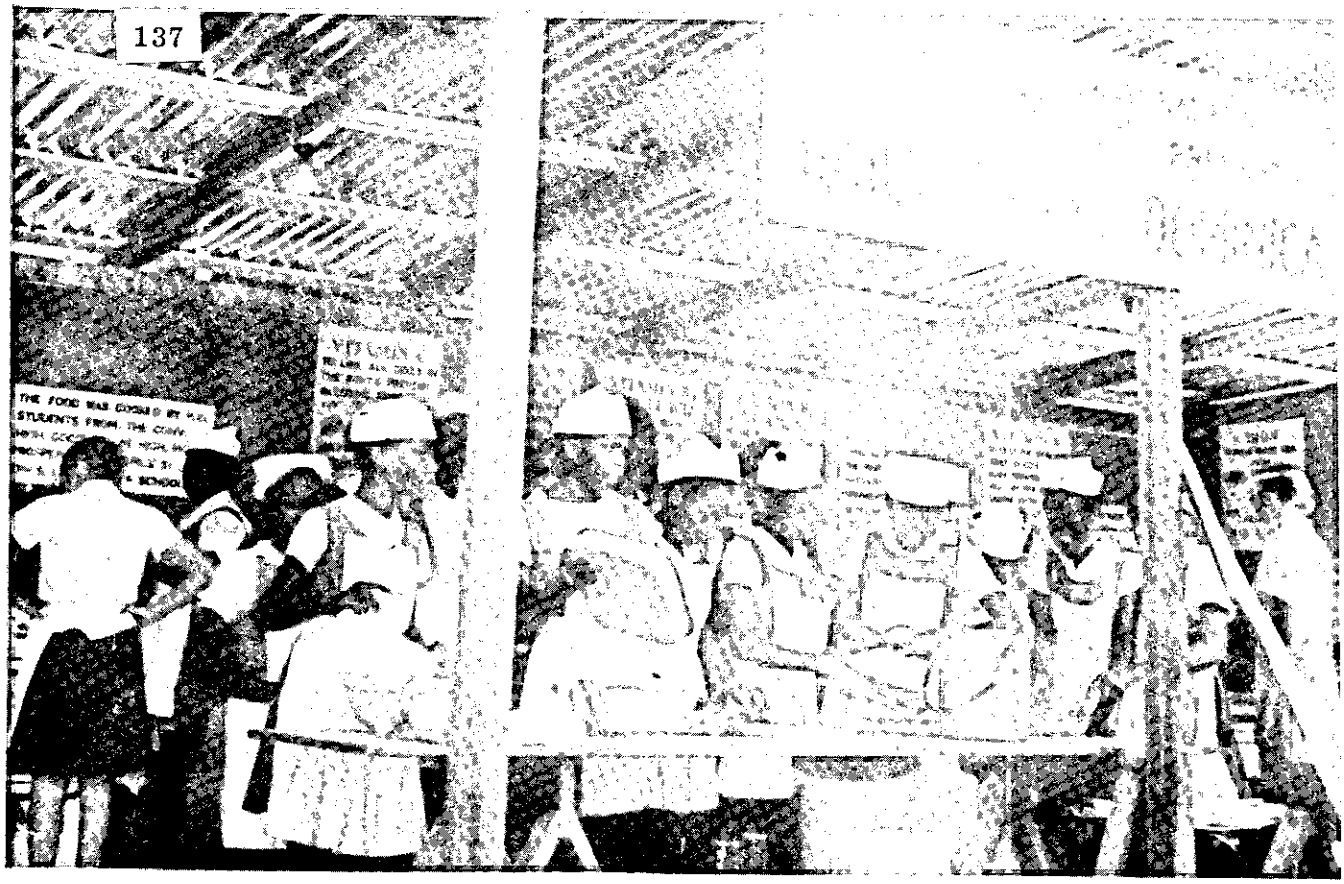

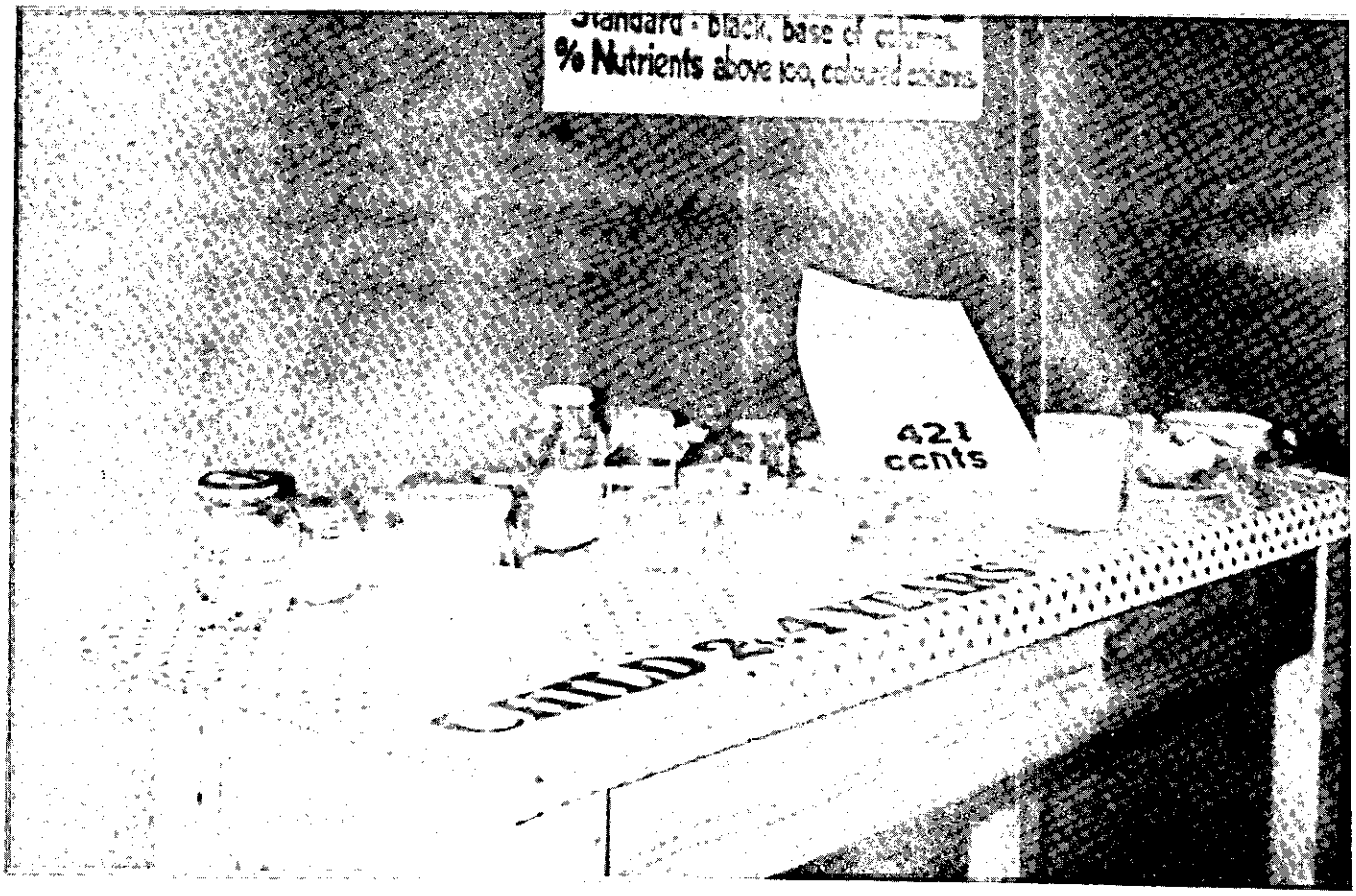
% Nutrients above
421
cents

The day's menu was based mainly on local foods, and was not too dissimilar to the Dominican eating pattern, which, in general (except for some infants and toddlers) is fairly adequate but for insufficient milk. Shop-bought bread, except as a small amount of breadcrumbs, was omitted because the price of bread has doubled since the devaluation of the pound, whereas flour, that chiefly replaced bread in the menu has risen in price by only 25 - 30%. Every family member had a minimum of 2 oz. (dry weight) of skim milk powder and quantities of milk and other foods were adjusted to the nutritional needs of each family member. The day's menu was as follows:

MENU FOR THE DAY

Breakfast - Dasheen Cakes and/or Cream of Wheat, Banana Milk Shake

Lunch - Fish Broth, Guava Crumble or Ripe Pawpaw

Snack - Banana Bread, Soursop Punch or Soursop Milk or Orange Juice

Supper - Pigeon Pea and Spinach Soup, Stuffed Breadfruit or Sweet Potato Surprise, Lettuce and Grated Carrot Salad.

The costs of the day's meals were: for the 3-month old baby 14½ cents; the 6-month old 28¾ cents; the 9-month old 33½ cents; the year old baby 44½ cents; the 2 to 4-year old 42¾ cents; the 6 - 9 year old school child 61 cents; the adolescent girl and boy 72¼ and 84 cents respectively; the the man's meals cost 79 cents; the woman's 61½ cents, which rose to 67¢ in pregnancy and to 87¢ in lactation. Many visitors were astonished at the low costs of the appetizing meals.

The food was prepared and cooked by girls from the local schools where they are taught Home Economics. The posters were painted by school children.

On the last two evenings samples of the exhibited dishes were given to visitors. The dishes for sampling were freshly cooked in the booth. The samples were served by the home economics girls and some HENNA members. The utensils were washed on the spot. At all times one or more HENNA members were in attendance in the booth to answer questions and to explain the purpose of the exhibition to interested visitors.

Close on 12,000 "hand-outs" were, in fact handed out. These included Illustrated Basic Food Groups, and these adjusted for age and sex, and the menu and recipes which were in great demand.

Altogether, the Agricultural Fair was a great success, and the Nutrition booth was popular (especially when the food samples were served!). The organization of the HENNA booth was truly a co-operative effort. It involved children from 7 schools (some of the home economics girls came from 10 miles away to work in the booth) and the Home economics teachers from these schools, most of whom are Henna members. Other co-operating members of HENNA included their president, who is a nun and the Principal of a participating school.

The treasurer and secretary of HENNA offered valuable assistance as did a V.S.O. Hospital Dietician, a Save-the-Children Fund officer, a Community Development officer and a WHO Nutritionist. The Nuns at the Catholic Social Centre also helped greatly, particularly in allowing their refrigerators to be used to store the exhibition food that was often needed at odd and inconvenient hours. A nun from the Catholic Social Centre kindly took the photographs illustrating this article.

RECIPES

We publish below the recipes for these economical meals, as we are sure they will be of interest to some of the many Home Economists in the area who receive 'Cajanus'. - EDITOR.

Dasheen Cakes

(Yield: 20-22 cakes- cooking time 40 mins.)

3 lbs. dasheen
4 oz. (¾ cup)flour
1½ teasp. baking powder
½ oz. (2 tbs.) grated onion
2 teasp. salt
1 teasp. pepper
4 teasp. chopped parsley
2 lightly beaten eggs
1 cup breadcrumbs
Oil for frying

Method

1. Wash the dasheen thoroughly. Cover with water in a large saucepan. Bring to boil. Cook until tender (about 30 minutes). Discard cooking water. Peel dasheen and mash with a spoon or fork.

2. Sift the flour, baking powder, salt and pepper together. Add to the dasheen.

3. Mix well. Shape into cakes about 1 inch deep and 2 inches in diameter.

4. Drop into smoking hot oil. Fry until golden brown all round.

Cream of Wheat

(Yield: 4 cups - cooking time: 10 mins.)

¾ cup Cream of Wheat
½ teasp. salt
3¾ cups water
2 oz. (4 Tbs.) sugar
1 oz. (¼ cup) skim milk powder
1 cup water to mix powder

Method

1. Add salt to measured water. Bring to boil. Sprinkle in the Cream of Wheat, stirring constantly until the mixture begins to thicken. Lower heat and cook 5 minutes longer, stirring occasionally. Add sugar and mix well.

2. Meanwhile, mix milk powder to a smooth paste with a little water, then add the rest of the water. Pour the milk through a strainer and rub out lumps.

3. Serve the Cream of Wheat. Pour the milk over the serving.

Banana Milk Shake

(Yield: 10 cups)

10 oz. (2½ cups) skim milk powder
10 ripe bananas
10 cups water to mix powder
2 oz. (4 tbs.) sugar
1 tbs. vanilla essence (optional)
10 tbs. chipped ice (optional)

Method

1. Peel, then mash the bananas to a paste with a fork.

2. Mix milk powder to a smooth paste with a little measured water, then add the rest of the water. Pour the milk through a strainer to rub out lumps.

3. Place milk, sugar, vanilla and mashed banana in a shaker or jar with cover. Cover tightly and shake well. Chill and serve with chipped ice.

Fish Broth

(Yield 16 cups - cooking time 1 hour)

12 oz. Cod fish
3 lbs. Irish potatoes
2 oz. (2 small) onions
4 tbs. chopped parsley
4 oz. (1 cup) skim milk powder
4 cups water to mix powder
2 oz. (6 tbs.) flour
1 teasp. pepper

Method

1. Wash fish and cover with water in a saucepan. Bring to boil. Cook for 15 minutes. Discard cooking water. Repeat once.

2. Meanwhile, mix milk powder to a smooth paste with a little measured water, add the rest of the water and pour milk through a strainer to rub out lumps.

3. Peel and chop onion. Wash, peel and dice (cut into small cubes) potato. Add pepper and cover with 4 cups water (for the exhibition) or 8 quarts water (for samples). Cook for 20-25 minutes in a closed pan.

4. Meanwhile, mix flour to a smooth paste with a little milk. Gradually add the rest of the milk stirring to prevent lumps forming. Pour into the broth. Stir until broth thickens, then cook on low heat for 10 minutes longer. Serve garnished with parsley.

Guava Crumble

(Yield: 4½ cups - cooking time 40 mins.)

2 lbs. guavas
3 oz. (6 tbs,) sugar
About 1 cup water
¼ teasp. ginger (optional)

4 oz. (½ cup) margarine
8 oz. flour
¼ teasp. salt

Method

(pre-set oven to 350°F. (regulo 4))

1. Wash guavas. Peel if skin is tough. Slice into a saucepan. Add sugar, ginger and water. Cook in a covered pan until tender, about 15 mins.

2. Turn into a greased Pyrex or pie dish.

3. Meanwhile, sift flour and salt into mixing bowl. Rub margarine into the flour until mixture is crumbly. Spread this over guavas and press down lightly. Cook in a moderate oven (350°F.) until golden brown, about 20 minutes.

Banana Bread

(Yield: about a 2-lb. loaf cooking time 1 hour)

12 oz. (2¼ cups) flour
1 teasp. salt
4 teasp. baking powder
3 oz.(6 tbs.) margarine
1 egg
4 ripe bananas
6 oz. (¾ cup) sugar

Method *(Pre-heat oven to 350°F.)*

1. Cream margarine with sugar in a mixing bowl. Add egg and beat well.

2. Sift together flour, salt and baking powder.

3. Peel and mash bananas. Add these and flour alternately to creamed mixture.

4. Pour into a greased bread tin. Bake in a moderate oven (350°F.) for 1 hour.

Soursop Punch and Soursop Milk

(Yield: 10 cups)

About 2½ lbs. soursop
1 quart water
pinch salt
Juice from 1 lime
4 oz. (½ cup) sugar
½ cup boiling water to dissolve sugar
7 oz. (1¾ cups) skim milk powder

Method

1. Wash and peel soursop. Mash to a pulp in a mixing bowl. Gradually stir a quart of water (for exhibition) or 10 quarts of water (for samples) into the pulp. Mix well and rub through a strainer.

2. Dissolve sugar in boiling water. Add to strained juice.
FOR THE PUNCH: For the exhibition.. ...Pour 2 cups of juice into a jar. Add lime juice to taste. For samples.... Pour half the juice into a jar or bottle. Flavour with lime Juice.

FOR SOURSOP MILK: For the exhibition....Mix milk powder to a smooth paste with a little of the remaining juice then add the rest of the juice, pour through a strainer to rub out lumps. Chill and serve.

For samples.....Mix milk powder to a smooth paste with a little of the remaining juice, add the rest of the juice. Pour, through a strainer to rub out juice. Chill and serve.

Pigeon Pea and Spinach soup *(yield: 6 cups, cooking time 40-50 mins.)*

12 oz. (1½ cups) pigeon peas
6 - 7 cups water
3 teasp. salt
1 oz. (4 tbs) chopped onion
1 tbs. oil
2 bundles spinach
1 - 2 teasp. salt.

Method

1. Remove any foreign matter from peas. Wash once. Place in a saucepan. Add salt and water. Bring to boil, then cook with low heat and lid not quite closed until tender, about 40 minutes. If too much water evaporates while cooking, replace with more.

2. Meanwhile, fry onion in heated oil until tender but not brown. Add to the cooking peas.

3. Also meanwhile discard any rough or bad parts from spinach. Wash leaves under running water. Cover the bottom of a pan with water. Add salt. Bring to boil. Add spinach and boil rapidly tightly covered for 5 - 7 minutes. DO NOT DISCARD COOKING WATER. Chop spinach leaves. Add these and the cooking water to the pea soup. Serve hot.

Stuffed Breadfruit or Sweet Potato Surprise *(Yield: 8 servings)*

Cooking time:
Stuffed breadfruit 1¼ hour
S. Potato surprise 40-50 mins.

2 breadfruit about 2½ lbs. each
OR 4 lbs. sweet potatoes
8 oz. Corned beef
2½ cups breadcrumbs
4 tbs. chopped onion
1 tbs. oil
½ lbs. tomato
½ oz. (2 tbs). skim milk powder)

Method

FOR BREADFRUIT: 1. Wash breadfruit. Cut off a ½" thick slice from stalk end. Scoop out core. Parboil breadfruit in salted for 20 - 30 minutes.

FOR SWEET POTATOES. 1. Scrub potatoes, dry and rub skins with greased paper. Place on a baking shelf in a moderately hot oven 400-450 degrees F. and cook for 40-50 minutes or until tender. They are done if they feel soft when squeezed in a cloth.

FOR BOTH DISHES. 2. Meanwhile, fry onion in heated oil until tender but not brown.

3. Wash and slice tomato, fry lightly with onion. Add salt and pepper.

4. Mix milk powder to a smooth paste with a little water, then add the rest of the water. Pour milk through strainer to rub out lumps.

5. Mash corned beef with fork. Mix together corned beef, breadcrumbs, onion and tomato mixture and milk.

FOR BREADFRUIT: Stuff breadfruit with corned beef mixture. Replace the cut slice on breadfruit. Cover with greaseproof paper. Place in a baking tin and bake in a moderate oven 350 degrees F. for about 45 minutes. Alternatively roast in a open fire.

FOR SWEET POTATO: Cut the baked potatoes in half lengthwise. Spread the corned beef mixture on each half of the potato. Return to the oven to heat through again, for about 10 minutes.

GENERAL NUTRITION NEWS AND OPINION

DIARRHEAL INFECTION AND INFANT MORTALITY

Facilities for food and dish storage and for dish washing are meager; and the care of infants and preschool children is of necessity frequently assigned to others - usually young school-age children. Formerly, when infants were commonly breast fed, the mother carried the child on her back while she went about her work. Now the majority of infants are formula fed, and thus other people are assigned the duty of feeding and caring for the child. This results in possible contamination of formula bottles as well as of other foods.

Diarrheal infections, especially when uncontrolled, seriously affect the general nutrition of the child. During the course of the infection, valuable electrolytes are lost and there is interference with normal feeding procedures, thus preventing suitable replacement.

The incidence and severity of these diseases, in this as in other parts of the world, are related to child care and child feeding practices. In a recent trial food surveillance study in four villages, it was found that mothers residing in the two villages with a resident sanitation aide were more likely to boil the water used in formula preparation for the advised length of time and also adequately to cleanse and store the formula bottles and nipples than they would without this more constant guidance and encouragement. In all four study villages, however, gross contamination of bottle and nipple during the feeding period was often observed. The formula bottle

may fall to the floor, then be picked up, cursorily wiped off and returned to the infant, or it may be used by an older preschool child before being returned to the infant.

A typical description of the common situation among many people in many tropical countries, one might say. In fact, the people referred to are Eskimos and the place Kuskokwim - Yukon Delta in Alaska. Plus ca change, plus c'est la même chose. The passage is taken from an article in 'Environmental Health, vol.17, page 603, entitled "Nutrition in the Artic", by E. M. Scott and C. M. Heller.

OVERCOMING WORLD HUNGER

The following represents conclusions of a session of the American Assembly which took place October 31 - November 3, 1968. The American Assembly was established by Dwight D. Eisenhower at Columbia University in 1950. It holds nonpartisan meetings to illuminate issues of US policy. The following is reproduced here as a good summary of enlightened opinion on the subject in the U.S.A.

We realize that the essential elements to eliminate hunger from the earth are:

- Effective measures to reduce population growth;
- Effective measures to increase food production in hungry nations, and to assure its effective distribution to all persons in the population of each country, with interim food aid from advanced countries;
- Economic, political and social changes in developing countries designed to promote total economic development, without which the above cannot be achieved; and
- Substantial assistance toward all these objectives by the advanced countries.

Thus, the objectives are recognized. *But effective action is urgently needed now.*

The Thirty-fourth American Assembly therefore recommends:

1. There should be immediate expansion of programs to reduce population growth. It is on the success of these, among other efforts, that the hope for civil order and political coherence depends. Reductions in in the rate of population growth are as important in fostering economic and human development generally as they are in reducing the strain on national food supplies.

Present programs to reduce birth rates in developing nations should be expanded and new programs initiated emphasizing voluntary family planning.

Research in reproductive biology and contraceptive technology should be greatly enlarged and accelerated. Also essential are greater understanding of the social, economic and health conditions that will lead to smaller families. Most of the funds for this research must come from the governments of the United States and other industrialized countries, but additional funds should come from foundations and other private sources.

It is also important that the U.N. and its specialized agencies assume a leadership role in the global efforts to reduce the rate of world population growth.

2. There is an urgent need for coordinated and greatly expanded national and international research efforts. These must be focused on those problems inhibiting increases in productivity and profitability of most crop and animal species in most areas of most developing countries. This is a prerequisite in most situations to modernization of agriculture and the achievement of substantial increases in income for vast numbers of rural people.

3. The developing nations, with assistance from advanced nations, should take the needed steps to achieve large increases in:

a. The availability and use of such production inputs as improved crop varieties (especially those with higher protein content and quality), water, arable land, and fertilizer, pesticides and machinery, locally produced where possible;

b. Protein consumption from low cost sources such as fish and oil seeds, as well as livestock and poultry;

c. The enrichment of foods with essential minerals and with chemically produced nutriments such as vitamins and amino acids;

d. Public and private investment in marketing and processing systems to move food from the farm to all consumers;

e. Communication media, private as well as public, to provide information to producers and consumers.

4. To achieve at least the 4 per cent annual rate of increased food production in the developing countries, both the amount of total investment and the effectiveness with which it is applied for overall economic development must be substantially increased.

5. Advanced nations should continue to make food aid available to the hungry nations but in such a manner that agricultural development among the recipients will not be retarded. Future emphasis should focus upon improved nutrition through more protein and upon sound economic growth and less upon total food tonnage and surplus crop disposal.

6. International trade and monetary policies should be modified to encourage balanced economic growth in all countries and to permit developing nations to earn foreign exchange increasingly through commercial trade rather than through grants and concessional loans. At a minimum, the discriminatory barriers to imports from developing countries should be removed by the United States and other advanced nations with appropriate adjustment assistance to those adversely affected.

7. Qualified technical personnel to conduct the wide variety of activities related to food production, marketing and distribution, and to improve nutrition, will be required in greatly increased numbers. In the long run, first-rate national institutions in each country should meet these needs.

For the foreseeable future, American universities are capable of making a unique contribution, both through properly adapted programs of education and training in the United States, and in helping to build institutions to meet these needs in the developing countries. To be more effective, there must be long-range policy and financial commitments from the United States government for programs of agricultural research and training related to the problems of developing countries, and the continuing support of expoerts and specialists prepared to devote a major part of their careers to this vital work.

Furthermore, United States universities in cooperation with host universities could undertake major research programs directed to the problems of developing countries. However, this can be done only with adequate long term financing.

8. Strong incentives should be established and maintained in hungry nations to accelerate the adoption by farmers of techniques which will increase production. These incentives include price guarantees and subsidies to encourage the use of improved production practices and of improved seeds, fertilizer and insecticides.

9. Supply of critical goods and services by local and other industry is vital to intensification of agricultural production. It is also vital to increase United States private foreign investment and efforts of private, non-profit organizations to transfer capital, skill and know-how. The United States government is urged to seek arrangements by which United States industry can invest, usefully and safely, wherever needed.

The United States government should provide more incentives for expanded activities and investment through such policies as risk insurance, tax incentives and encouraging foreign governments to create more favourable business climates. Investments made by the United States corporations in less-developed countries in agricultural development should be exempt from United States government controls on capital export and repatriation of earnings. There must be closer cooperation with governmental agencies; private agencies need to be brought very early into planning and feasibility studies.

10. The United States should press for international arrangements to insure that the oceans, outside reasonable territorial limits be available for the use and benefit of all mankind. We acknowledge the importance of marine products as a source of protein and we urge continued and accelerated research on its economic feasibility and consumer acceptance. It should be emphasized, however, that for the remainder of this century at least, most of the increased food consumed by the world's people will come from farm land.

11. We recommend that the search be more vigorously pushed for new plants, and for possible uses of wild animal life. We applaud the establishment of research centres which are assembling and classifying valuable plant and animal genetic material useful in producing new and improved foods.

12. Farmers of developing nations should be encouraged and assisted in establishing cooperative organizations so they can share in the investment and in the use of needed inputs more advantageously, promote better markets for their products, and obtain credit on more favourable terms.

13. While further improvement can be made in United States aid and the coordination of government, voluntary and private activities, it is important to move forward from where we are. The ground that has been gained in the administration of United States assistance efforts should not be lost by the new administration.

Greater efforts must be made by churches, public information media, universities and other concerned organizations in the United States to increase public awareness of positive accomplishments of United States foreign assistance and of the need for continuing and greatly enlarged commitments of resources to this purpose in the future.

14. In dealing with all aspects of agricultural development and population growth, the Assembly recognizes the values of multilateral effort. The Assembly urges the United States government, in concert with other governments, to give increased support to the United Nations and its specialized agencies, and to international institutions, and to encourage steadily more effective work on their part.

The advanced nations have a common interest in providing technical and capital assistance to the developing nations. We deplore the fact that, in recent years, while other developed nations have been increasing their aid, assistance by the United States has been drastically reduced. We now rank seventh in the percentage of national income that we devote to foreign aid. We recommend that the level of United States assistance should not only be returned to earlier levels, but should be further increased by about 50 per cent. Such assistance from the developed countries is essential to achieve the goals outlined above.

An effective political constituency for foreign aid is needed and can be developed in this country through the traditional American mechanisms, with public discussion and confrontation among groups having diverse interests leading to agreement on common goals and policies.

PAHO BEGINS PUBLICATION OF A QUARTERLY GAZETTE

The Pan-American Health Organization (Regional Office of the World Health Organization) has issued the first number of a quarterly 'Gazette'. This is a newsletter addressed, as Dr. Horwitz, Director of PAHO, says in a forword to the first number (January - March 1969), to persons interested in a clear but concise account of the advances in reducing disease in the region and

promoting individual and community well-being".

The first issue contains 12 pages of illustrated text, describing three current projects which governments are carrying out with PAHO assistance, (malaria control in Guatemala, goitre prevention in Equador, TB treatment in Colombia) and a number of news features. It is not a technical journal but is a brief newsletter written without use of technical jargon, and each issue will highlight several such joint government-PAHO projects in addition to its news context. Among these features there will certainly be some nutrition projects and others which closely relate to nutrition. The Gazette would particularly interest officials of Ministries of Health and probably also of Ministries of Education, and could be obtained through the PAHO Representatives in each country.

THE NEED FOR HUMAN NUTRITION STUDIES IN THE CURRICULA OF UNIVERSITIES AND COLLEGES OF AGRICULTURE

by

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Mankind requires food for his sustenance and agriculturists are responsible for the production of this food, both animal and vegetable. The planning of food supplies and the provision of adequate diets for the people of the world has become one of the most important problems confronting mankind. Today, agriculturists are faced with the immense problem of providing enough of the right kinds of foods for the present population and, at the same time, planning for ever increasing numbers, particularly in the developing areas of the world.

This situation demands the closest liaison between nutritionists and agriculturists to establish common policies; it is essential that nutritionists are familiar with the general principles of agricultural production and that agriculturists are aware of the principles of human nutrition and food planning.

For some time university faculties and departments of nutrition have recognized the importance of including some agricultural subjects in undergraduate courses leading to bachelors degrees and many of them (e.g. the Universities of London, England; Giessen, Germany; Wageningen, Netherlands; Cornell, USA) include obligatory courses in Agriculture and require students to be examined in them before they gain degrees in Human Nutrition. So far,

few degrees or diploma courses in Agriculture include Human Nutrition. Why does this situation exist, why should it be changed, and how should this be done?

The curricula at universities and colleges of agriculture are already often overburdened and they have constantly to be adapted to the technical advances made in the various sciences that fall within the scope of agricultural studies. It is becoming increasingly difficult for the general agricultural syllabus adequately to cover the various subject matter areas that must be studied. An additional subject like Human Nutrition, therefore,may be resisted on the grounds that it can only be included at the expense of existing subjects. There is, however, a clear case for attempting to link these two vital components of the world food problem.

How can human nutrition studies be introduced into the curricula of agriculturists with the least possible disturbance to the already existing syllabuses? It must be stressed that the intention is not to try to convert every agricultural student into a nutritionist, but rather to ensure that agriculturists are equipped to take a constructive interest in the food and nutrition problems confronting mankind, as well as appreciating the role of agriculture in their solution.

In the general agricultural degree or diploma courses much of the necessary food and nutrition content could readily be introduced into the basic science and Animal Nutrition courses with little disturbance to existing curricula. Further, orientation could be given through the general courses in Agricultural

Chemistry, by including subjects such as the nutritive values of foods for man, in addition to those for animals; and into Agricultural Economics by including food planning, the establishment of nutritional targets, and so on.

Nutrition in Specialized Courses

For agriculturists studying for specialist or honours degrees it is desirable that, in addition to the general orientation, more attention should be devoted to the studies with a close relevance to human nutrition. The approach will depend upon the specialization concerned. To take one example, consider the case of a student specializing in Crop Husbandry. During the first year of study the student will have undertaken courses in the basic sciences followed by courses in various agricultural subjects during the following two years. If the necessary nutritional orientation had been introduced during these years he will have received general training in Human Nutrition. During his final years of specialization the following topics, of special relevance to the nutrition of man, could be introduced into the Crop Husbandry curriculum:

- Staple food crops and their nutritional significance
- Chemical composition and nutritive value of food crops
- Evaluation of protein quality of food crops
- Crop yields in terms of calories, protein and nutrients
- Dietary improvement through crop production
- Breeding for improved nutritive value (e.g. hybridized maize varieties with enhanced lysine levels)

- The assessment of the food and nutrition situation, on area and national bases.
- Food balance sheets
- Nutrition objectives and nutrition targets and the role of crop production in their attainment
- The economics of food crop production
- Food crop planning
- The place of food crops in overall socio-economic planning
- The role of food crops in meeting future food needs
- The nutritional significance of crop rotations and farming patterns
- Nutritional diseases or problems associated with different staple crops, ecological regions and farming patterns.

The inclusion of these subjects in the final phase of study of the Crop Husbandry specialist should not significantly disturb the formal study program. Only occasional special lectures need be given such as "Food Balance Sheets" and the"Establishment of Nutrition Targets and their Attainment through Crop Production".

One of the factors militating against the inclusion of human nutrition studies in courses for agriculturists is the shortage of teachers with the qualifications to enable them to teach at higher educational levels. Very few agriculturists have also been trained in Human Nutrition, and still fewer human nutritionists have obtained further training in Agriculture. The problem, though great, is not insuperable.

In considering this problem of personnel to teach in faculties and colleges or agriculture it should be remembered that many of the cornerstones of human nutritional science were laid by agricultural scientists. The pioneering work, of Boussingault, Kellner and Armsby among others, and, more recently, people like Virtanen and Maynard did much to formulate the principles of human nutrition through their work on domestic animals; and it is undoubtedly true to say that nutrition, as a science, was first recognized and developed by agriculturists. Recently, human nutrition seems to have lost its place in the training of agriculturists. It seems paradoxical that agriculturists should be familiar with the principles of plant and animal nutrition and yet know little about human nutrition, since the end-point of most of their endeavours concerns the maintenance of a good state of nutrition in man.

Orientation in Agriculture and in Nutrition

In all the developed countries of the world there are suitably qualified nutritionists who can undertake teaching duties in faculties and colleges of agriculture. Although few have received any training in agricultural sciences it would not be difficult for them to receive orientation in agriculture, so as to adapt their food and nutrition teaching to the needs of the students. Most developing countries also now possess small numbers of nutritional scientists, but not enough to provide lecturers in every faculty or college of agri culture. Thus, for example, India possesses 74 universities and colleges of agriculture, and it would be impracticable for each of these institutions to appoint nutritionists to their staffs: qualified personnel are just not

available. In such circumstances the only solution is to arrange orientation courses in human nutrition for lecturers already teaching in the universities and colleges of agriculture. It is interesting to note that at the present time, FAO, with the financial asssistance of UNICEF, is helping the Government of India to organize an orientation course of this type in Calcutta for twenty five lecturers from faculties and colleges of agriculture in India.

For some years FAO has also been assisting in the organization of an eight-month Nutrition Training Course at the University of La Molina, Peru, for agriculturists, many of whom are now occupied in teaching posts in agricultural institutions. This course will, in future, be organized in Bogota, Colombia, and continue to be designed specifically for agriculturists.

Agriculturists have been encouraged to attend postgraduate courses in Nutrition which FAO and UNICEF have assisted in organizing in recent years through relationships established between European and African Universities. This has helped to establish permanent training facilities in nutrition closely associated with a Faculty of Agriculture in one African country (University of Ibadan, Nigeria). In other instances, nutrition teaching has been introduced without formal links with a European University. Thus, agricultural studnets at the University of Makerere in Uganda now receive lectures in Nutrition as they also do at the Agricultural University of Njala, Sierra Leone, and at the College of Agriculture at Egerton, Kenya. The establishment of a Department of Biochemistry, Food Science and Nutrition in the

Faculty of Agriculture at the University of Legon, Ghana, has assured the introduction of nutrition into the training of agriculturists in that country.

FAO has been closely associated with the establishment of all the facilities mentioned and will continue in its efforts to assist in the inclusion of Human Nutrition in agricultural training. Where the necessary facilities do not exist in developing countries fellowships will be awarded for training abroad, and, when necessary, the organization of ad hoc training courses and seminars. As a result, it is hoped that within the next decade each major Faculty or College of Agriculture in developing countries will possess the appropriate staff and resources to establish departments of Food and Nutrition.

Although the necessity of including Nutrition in the training of agriculturists is of the greatest importance in developing countries it is also of significance in those developed countries where food production is at present satisfactory, as well as those dependent upon imported food. Further, since the agricultural curricula of educational institutions in developed countries have in the past so often provided the basis for courses in developing countries, developed countries should point the way by including Human Nutrition in their agricultural training programs. At present, a mere handful of European schools of Agriculture do so.

Mission to European Countries

In 1961, a joint FAO/WHO Mission visited six western European Countries to report on the place of nutrition training in universities, colleges and other institutions. In the countries visited the mission considered that facilities for nutrition training were inadequate, and, generally speaking, completely lacking in university level educational programs, including those of faculties and colleges of agriculture. Since 1961, three European universities have announced the establishment of nutrition training facilities in faculties of agriculture (Oslo, Norway; Nottingham, U.K.; and Cambridge, U.K.). Though this represents progress, it is not enough, and the European Commission on Agriculture (ECA) which met in Rome in May, 1967, recommended that FAO should draw the attention of European Governments to the need for including training in food and human nutrition in the curricula of agricultural training establishments. This matter is being actively pursued by the FAO Secretariat; and following another recommendation of the ECA it will be further discussed as an item on the agenda of the forthcoming biennial FAO Conference.

It is fully appreciated that university budgeting is such that the financial and other provisions necessary for the establishment of academic posts and facilities for including Human Nutr tion in the training of agriculturists cannot be established overnight. They require careful planning, and thought must be given to deciding whether it is feasible or desirable to try to establish a Department of Nutrition within a faculty or college of agriculture

at the outset. It may be better, in the first instance, to include a Nutrition Section or perhaps just a lectureship in Nutrition within one of the existing departments.

Attention should be paid to the traditional or current interests of the different departments or the faculty before deciding the location of such units or lectureships. It may be that in one faculty the establishment of a teaching post in Food Economics within a Department of Agricultural Economics would be most feasible, whereas in others it may be one in Human Nutrition within a Department of Agricultural Biochemistry or, for example, Diary Science; in other instances it may be a lectureship or unit of Nutrition Education within a department of Agricultural Extension.

As yet there are no textbooks, either in the field of Agriculture or in Human Nutrition, that give adequate consideraton to the agricultural and agro-economic aspects of nutrition. The nearest approach that has been made to covering these subjects has been in "Nutrition et Alimentation Tropicales" by Autret and Ganzin. Some classical textbooks in Animal Nutrition (e.g. Looslie and Maynard) consider certain aspects of human nutrition (such as calorimetry and energy expenditure) and some in the field of Human Nutrition and Dietetics (e.g. Davidson and Passmore) deal with certain specific aspects of agriculture in relation to nutrition. However, it must be recognized that at present there is no textbook that could provide the overall basic and applied knowledge in the field of Food and Nutrition, from which a student of agriculture could obtain a general orientation, let alone

specific knowledge. This is a problem that must be rectified if the goals we set ourselves relating to human nutrition in the training of agriculturists, are to be realized. However, the FAO/WHO/UNICEF Textbook and Manuals project has resulted in the production of a number of publications* that help to fill this gap and various other booklets** and technical reports*** have been prepared by FAO that can make a contribution to the technical knowledge that requires to be imparted to agricultural students.

Why Nutrition for Agriculturists?

Why should human nutrition form an important component of the training of agriculturists? First, as has already been stressed, it is desirable for its own sake, because of the intricate relationship between food supplies and the nutritional status of populations dependent upon them.

Secondly, agriculturists with a knowledge of human nutrition can furnish information and prepare documentation on factors affecting human nutrition that Ministries of Health (and other Ministries) often cannot supply. Such advice may be at the planning level, or on the production, importation and distribution of foods, on embargos and tariffs that may be desirable on agricultural and nutritional grounds; on the elaboration of food policies and agricultural subsidies. It can assist in determining food regulations and food standards; in undertaking technical, educational and other measures

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*eg. "Nutrition in Relation to Agricultural Production" by I.S. Dema.
**eg. The FFHC Basic Studies Series No.5 "Nutrition and Working Efficiency".
***eg. FAO Nutritional Studies Series, No. 15 "Calorie Requirements".

concerning food and, in the overall sense, orientating food production to meet the food requirements of populations.

Thirdly, agriculturists with a knowledge of human nutrition are increasingly required to assist in undertaking applied nutrition programs in a whole range of agricultural contexts, from poultry raising to promoting increased production of grain legumes, throughout the developing areas of the world. As countries begin to realize the magnitude of the food and nutrition problems with which they are confronted, and the need for appropriate personnel to deal with their solution, large numbers of agriculturists are required with a knowledge of the broad principles of human nutrition.

Fourthly and lastly, Ministries of Agriculture throughout the world are coming to appreciate their crucial responsibilities in the face of their food and nutrition problems. In the past this was often assumed to be the perogative of Ministries of Health. But while such ministries continue to have important responsibilities in defining the form and extent of nutritional deficiencies in any given situation and their treatment, the long-term solution to the problems lies in the improvement of food consumption levels for which Ministries of Food and Agriculture are almost exclusively responsible. The world is beginning to recognize the role that food production has to play in its destiny; the preliminary results of studies for the Indicative World Plan stress the vital importance of this role.

The attainment of twin goals of improving food supplies and food consumption levels demand closer associations in the training of agriculturists and nutritionists so that a core of personnel is available and equipped to combat the greatest problem that has yet faced mankind - that of adequately feeding itself.

CFNI NEWS

The course being conducted by CFNI for 31 students for the Diploma in Community Nutrition, (described in 'Cajanus' 7) has continued to be the main activity of the Institute during the past two months. We are at the time of writing (the last week of March) nearing the end of the first part of the course, given in Jamaica, during which time the students have been attending lectures and seminars at Mona, and making visits to various projects in Jamaica.

Soon we begin a more mobile phase of the course, and on 18th April pay a brief visit to Haiti, principally to observe the system of Mothercraft Centres there, a few days later visit nutrition projects in Puerto Rico, and arrive on May 1st in Barbados, where the students and staff will join with the Barbados government in conducting an extensive National Nutrition Survey there throughout May. This should offer the students excellent experience and a closer insight than could otherwise be obtained into the nutritional status of a West Indian people and the factors involved in causation of malnutrition.

Preparations for the Barbados Survey and for the analysis of the data are well advanced. The students will move to Trinidad for the period 5 June to 18 July, in the last week of which they will have examinations. It is hoped that the main body of the data gathered in Barbados will be

able to be presented to the students and to Barbados government representatives in the second week of July.

After the examinations in Trinidad the students will be returning to their own countries to carry out their three-month research projects which will complete the requirements for the diploma.

CFNI cooperated with the Scientific Research Council of Jamaica, and the United Manchester Association in carrying out a brief nutrition survey in mid-February in the Mandeville area, concorned with the nutritional status of children attending basic schools, and nutrition knowledge of their parents. The results should be of value in deciding on the content of a nutrition education programme which will be carried out by UMA among the parents of these children, and in evaluating achievement of the programme in due course.

The Mandeville Survey was also a very good field training experience much appreciated by the students, and also served to test our procedures for computer handling of data. The final format of all questionnaires and forms for such surveys was recently arrived at with the aid of Dr. M. Guzman, Director of Statistics, INCAP, who paid us a second visit in early March.

YOUR QUESTIONS ANSWERED

Q. Most mothers are averse to giving canned sardines to young children for fear of ptomaine poisoning. Is this a justifiable fear at the present time?

A. No. Apparently in earlier days when canning technology was not yet well developed, and the public were not as sensitive in discerning spoilage and bloated tins, there were relatively frequent cases of ptomaine poisoning. This had particularly acute and deleterious effect on young children, as a result of which strong resistance was built up to the use of this food for young children.

With the tremendous improvements in canning technology in recent years, the risk of ptomaine poisoning has been reduced to an almost negligible level. However there appears to be have been no corresponding effort made to break down the resistance built up earlier with the result that the old fear continues unabated, and canned foods such as sardines have steadily and surely disappeared from the young child's dietary. It would seem high time that an attempt be made to reinstate valuable protein foods like canned fish to their legitimate position in young child feeding.

Q. The Isish potato and Chocho (Christophene) hold exalted positions amongst foods used in young child feeding in the Caribbean. From the nutrition point of view are these the wisest choice?

A. Neither of these make any special contribution to a young child's diet. The potato would seem to be a carry over from feeding patterns in UK and USA

and the chocho seems to have gained popularity merely by virtue of its easy availability, mashability and neutral flavour. There are several other foods like legumes, dark green leafy vegetables and pumpkin which would be far superior foods than either irish potato or chocho in diets of young children in this area. It will however take much persuasion, education and time to gradually displace the firmly established potato and chocho by alternative supplementary foods.

Q. *What is the meaning of "Pica"? Is this habit nutritionally sound or deleterious to the health of children and pregnant women?*

A. The word "pica" which means magpie in Latin, refers to the habit of picking up and eating as does this bird, substances not normally eaten, including soil and clay.

The extensive literature on this subject has been reviewed by Halsted (1968) who notes that Pica is a world-wide phenomenon, affecting all socio-economic groups and both sexes, although it may be more prevalent in children under the age of three years and in pregnant women for whom it often appears to be culturally acceptable.

These strong cravings for abnormal substances have been linked for many centuries with superstitions, magical beliefs, mental derangement, the need to satiate extreme hunger and even a necessity to replace mineral substances lacking in the dietary. This latter point, however, has not yet been substantiated. No conclusive evidence was shown in animal

experiments in which cattle and sheep deficient in minerals were offered a salt lick reinforced with the required elements.

It is quite possible that many children will, unless corrected persist in their natural oral exploratory phase for several years and the child living in a mud hut floor will be more likely to ingest dirt than will the toddler in a play pen who is raised in a detergent - clean environment.

Pica and geophagia in the pregnant woman may be regarded by her relatives with approval, tolerance, amusement or dismay depending on the nature of her cravings, be it clay or starch (world-wide favourites) coffee grounds, sand or oyster shells.

From the public health point of view, some ill-effects of pica will be evident. Ingested soil containing helminth ova will give rise to ascariasis or may produce a bacterial diarrhoeal disease.

Studies conducted among pregnant women showed a higher incidence of toxaemia in the group affected by pica than other gravid women with no abnormal cravings.

In children, lead poisoning is not an infrequent finding. Iron deficiency has been reported in clay-eating subjects, this may be due to the cation exchange capacity of clay which inhibits iron absorption and speculations exist in relation to the metabolism of potassium, mercury and zinc when this popular substance is eaten in large quantities.

It is interesting to note that Avicenna, in the year 1000 A.D. was recomminding iron preparations to counteract the ill effects of pica, but his methods of health education in controlling and eradicating this abnormality of behaviour "using in boys the whip, in older patients by restraints, prison and medical exhibits and abandoning incorrigible ones to the grave" may not be as popular in nutritional circles in this "enlightened" 20th century.

Reference: Halsted, J.A. (1968) American Journal of Clinical Nutrition 22 - 12 pp. 1384 - 1398. Geophagia in Man: Its Nature and Nutritional Effects.

A NEW ERA IN WORLD AGRICULTURE*

by

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The thesis of this paper is that the world has recently entered a new agricultural era. It is difficult to date precisely this new era since many of the contributing factors have been years in the making. But in terms of measurable phenomena such as the sudden sweeping advances in food production in several major developing countries, the old era ended in 1966 and the new began in 1967.

During the early era, spanning the two decades from the end of World War II through 1966, the less developed world was characterized by (1) accelerating population growth, (2) a sharp reduction in the area of new land that could be readily brought under cultivation, (3) lagging food production, failing to match population growth in some instances, and (4) increasing dependence on food aid from external sources. During the 1950's food production in the developing countries increased largely as a result of expansion in the cultivated area; but as it became more difficult to bring new land under the plow during the early 1960's, the growth in production slowed perceptibly.

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* *Presented at first annual Senator Frank Carlson Symposium on World Population and Food Supply, Kansas State University, Manhattan, Kansas, December 3, 1968.*

The new era is characterized by explosive increases in production of principal crops in the larger developing countries of Asia. The 1968 Pakistan wheat harvest was up 37% over the previous record, possibly an increase without precedent in any major country. India's wheat crop this year was up 35 percent over the previous record; its total food grain harvest up 12 percent. Ceylon's rice crop has increased 34 percent during the past two years. The Philippines, with two consecutive dramatic gains in its rice crop, has apparently ended half a century of dependence on rice imports.

Favourable weather has contributed to the record harvests in some countries, such as India, but it is only one factor; these countries are now achieving takeoffs in yield per acre comparable to those achieved in the developed countries during the first half of this century. Increases in per acre wheat yields in Pakistan and India and of rice yields in the Philippines over the past two years may exceed those of the preceding several decades.

Thus far the most rapid advances have been concentrated in Asia, a region containing more than half the world's people. But countries elsewhere -- Mexico in Latin America and Kenya and the Ivory Coast in Africa -- are also enjoying the fruits of modern agricultural technology. Within the next several years the agricultural revolution will likely spread to most of the less developed world.

The new era is dynamic, providing new opportunities for farm families, promising to bring into the marketplace literally hundreds of millions who heretofore have eked out a subsistence living, consuming all that they produce.

This will broaden the market within individual developing countries, greatly enhancing the prospect for industrial development.

Engines of Change

The pronounced improvements in the economic and political climate for agricultural development and the massive introduction of the high-yielding varieties are dramatically improving the prospects for expanding food production in the developing countries. The new varieties may be to the agricultural revolution in the less developed world what the steam engine was to the industrial revolution in Europe.

Thus, the agricultural revolution now underway in the developing regions, principally Asia, is much more than just the conventional formula of using improved seeds, fertilizers, pesticides and more water. This is another characteristic of the new era. The new cereal varieties are not just marginally better than traditional ones; they are dramatically superior, frequently doubling yields, under field conditions. Their superiority is indicated by the rate of expansion in their use:

*Estimated Acreage in New High-Yielding Varieties in Asia**

Year	*Acres*
1964/65	200
1965/66	37,000
1966/67	4,800,000
1967/68	20,000,000
1968/69	34,000,000

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* *Dana G. Dalrymple, "Estimated area of High-Yielding Varieties of Grains in Ten Asian Nations," International Agricultural Development Service, US Department of Agriculture, November 1968. The 1968/69 figure represents goals.*

The new dimensions of the agricutural revolution now underway and the numerous sources of increased food production deriving from it make it difficult to comprehend. Some sources of potential increases in production are:

(1) Greater fertilizer responsiveness; the new varieties not only respond to much heavier applications of fertilizer but they use it more efficiently. If one pound of nitrogen fertilizer applied to the older varieties resulted in 10 pounds of additional grain production; a pound applied to the new varieties may result in 15 or, as has been recorded under very favourable circumstances, as much as 25 pounds of grain.

(2) The new varieties are aseasonal; unlike most of the traditional varieties they are not very sensitive to day length. They can, therefore, be planted at any time of the year in most of the tropics and sub-tropics where water supply permits.

(3) The new varieties are early maturing; in the case of rice, 120 days as contrasted with 150 to 180 days.

(4) Multiple cropping is increasing; both the possibility of planting year round and earlier maturity permit an increase in double or triple cropping. Farmers in India, Indonesia and the Philippines arenow double cropping rice and, in some instances, even triple cropping where water supplies are adequate. Where water supplies are not adequate during the dry season, farmers are beginning to plant high-yielding grain sorghums. Sorghums, after harvest, will again tiller in the tropics, permitting a second and often a third harvest from the one initial planting. Farmers in Mysore State in

India are producing three crops of corn every 14 months. In parts of Northern India and West Pakistan, rice is being grown during the summer monsoon season with wheat as the winter crop. Some farmers are able to plant a third crop such as potatoes or a protein crop like beans.

(5) Mechanization is increasing food production; new technologies require a re-examination of the feasibility of farm mechanization in densely populated, developing countries. Full use of the new technologies requires much greater inputs of labour in more careful planting, continuous weeding, frequent irrigation and the harvesting of much larger crops. Seasonal labour shortages in rural areas of Asia are becoming increasingly common. Farm mechanization will permit better seedbed preparation, enabling farmers to more fully realize the full genetic potential of new varieties. The possibility of continuous cropping throughout the year places a real premium on both rapid harvesting and seedbed preparation. My deputy, Dr. Lyle Schertz, describes this as follows:

> ....with the high-yielding varities that can be grown year round, each day of delay means 1 day of lost crop production. With 120-day rice capable of yielding 2 tons per acre, almost 40 pounds of paddy (rough rice) per acre per day are at stake.*

(6) The use of water, like fertilizer and other inputs, is rising steadily; the prospect of growing the new varieties throughout the year means that the value of water has increased sharply, particularly during the dry season. Farmers throughout Asia are investing heavily in tube-wells and pumps to lift

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* *Lyle P. Schertz, "The Role of Farm Mechanization in the Developing Countries," Foreign Agriculture, November 25, 1968, p. 3.*
Editor's note: See also page 81 of Cajanus 5, October 1968, in an article by M. S. Pawar about work with new rice strains in Guyana.)

water into their fields, either from underground sources or from low flowing rivers and canals during the dry season.

The potential increases in food production associated with the new varieties are only a partial listing, but they illustrate the dynamic nature of the new technologies.

Second Generation Problems

When agriculture begins to advance rapidly, as it is now doing in several developing countries, many new or second generation problems are created. Often these are problems of success. Such is the case in a number of countries where rapid increases in grain production are overloading the existing, antiquated marketing systems.

In some areas where farmers traditionally marketed one-third of their crop, their crop increased by one-third, as a result of adopting new production technologies. This means the marketable surplus has suddenly doubled. Few marketing systems are equipped to handle abrupt increases of this size. Over the past 15 years many of the larger coastal cities in Asia have become increasingly dependent on imported foodstuffs with their populations at times living quite literally from "ship to mouth". As countries begin to generate surplus in the rural interiors, a distribution system must be developed which will permit movement of such surplusses to the large coastal cities.*

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* For a more extended discussion of marketing problems, see Martin Kriesberg, "Marketing Food in Developing Nations - Second Phase of the War on Hunger," Journal of Marketing, October 1968, pp 55-60.

Another second generation problem quickly coming into focus in several countries is the lack of farm credit. During the early stages of innovation and adoption of new production practices, the larger farmers -- usually well situated financially -- are characteristically the first to use new inputs. Once use of a new input such as fertilizer begins to expand beyond the larger farmers, then the need for credit becomes acute. Without it some small farmers are, in effect, denied access to the new technologies.

A third problem beginning to plague a number of countries as grain production surges ahead is declining prices. Many countries have instituted price support programs for wheat and rice during the last few years while market prices have been relatively high. As market prices now begin to drop to the support level, many governments are hard pressed to maintain the price guarantees given farmers. As production expands, countries must also wrestle with such questions as - What is a desirable price level? and - How should the internal support level relate to the world market prices?

The new varieties, frequently less acceptable to consumer tastes than the familiar indigenous varieties, are often discounted in the marketplace. Over time, the discount usually diminishes as consumer tastes adjust to new varieities or breeding efforts alter them to suit local preferences.

As new agricultural technologies are adopted, their benefits are not distributed evenly. Those farmers with the more fertile soils and the more reliable year round water supplies stand to benefit most. The economic gap between the better farms and farmers and the more marginal ones is almost certain to widen in the developing countries as it seems to have in the United

States over the past half century.

This is not a definitive listing of second generation problems facing developing countries, but it does illustrate some of the more pressing ones.

The Renaissance in Agricultural Research

Agricultural research, an area of heavy investment within the United States over the past half century, but until quite recently largely neglected by both the international assistance agencies and the governments of the developing countries, is now being given some of the attention it deserves. The success of the Rockefeller Foundation's wheat breeding program in Mexico dating back to the 1940's and the lack of attention to rice in Asia led the Rockefeller and Ford Foundations to combine resources to establish the International Rice Research Institute in the Philippines in 1962. The relatively quick and dramatic payoffs in rice breeding, following the success with wheat, have awakened widespread interest in agricultural research in the developing countries.

Today, the work in Mexico is being carried out under the Rockefeller and Ford-sponsored International Maize and Wheat Improvement Centre (CIMMYT) at Chapingo. Two additional centres are being organized by the two Foundations: the International Centre for Tropical Agriculture (CIAT) in Palmira, Colombia, and the International Institute for Tropical Agriculture (IITA) in Ibadan, Nigeria. Rather than concentrate on particular crops, these latter two centres will work on tropical agriculture more broadly.

The return to society from investment in the established centres has been phenomenal. The cost of establishing and funding the International

Rice Research Institute has totaled some $15 million to date. The value of additional rice production resulting from the spread of new rice varieties and improved cultural practices is already in the hundreds of millions of dollars. Within the next several years it could total several billion of dollars!

The accomplishments of these foundation-sponsored research efforts are historic. But perhaps their most significant long term contribution will be the support they engender, and the encouragement they provide, for agricultural research in the developing countries.

Indigenous research establishments in several Asian countries have already released some exciting new varieties of cereals. Those now in use include: BPI-76 in the Philippines; H-4 in Ceylon, ADT-27 in India; and MexiPak-type wheats being released in Pakistan.

The plant breeders at the International Rice Research Institute, who developed the IR-8 miracle rice, expect that even it will be obsolete within a few years, replaced by still more efficient varieties. The Uttar Pradesh Agricultural University in India reports that Mexican-type wheats introduced only three years ago will soon become obsolete due to the development of even better varieties (Sonalika, Sona, and Chhoti Lerma). Breeding work on triple gene wheats is also very promising.

Within the next few years, we can expect agricultural research to gain further impetus as the large multinational agribusiness concerns* that manufacture fertilizer, pesticides and farm equipment, distribute seeds and process and market farm products, begin to invest in their own agricultural research.

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*Editor's note: e.g. Pioneer Hi-Bred Seed Corn Company in Jamaica, Texaco in Trinidad.

Such firms finance and conduct more than half of all agricultural research in the UNited States today.

Future Production Prospects

Are the recent agricultural advances a temporary phenomenon, or a new trend? They appear to be the latter. The agricultural revolution seems to have gone too far now to be arrested. Too much is at stake, too much has been invested, the expectations of too many people have been aroused. The agricultrual revolution in Asia should not, therefore, be viewed as an event but as the beginning of a process -- the eventual modernization of Asia.

Sources of potential food production increases in the future are, as indicated earlier, quite numerous. Prominent among these will be the steadily growing acreage planted to the ever more efficient crop varieties. This expanding acreage of fertilizer responsive varieties,. combined with the prospective reduction in cost of nitrogen fertilizer, will broaden the profitable opportunities for fertilizer use.

Cultural practices will improve as farmers re-examine traditional practices and experiment with new ones. The development of multiple cropping as a science will greatly increase the potential food production capacity.

The production revolution, now confined largely to major cereal crops will spread to other crops such as root crops, pulses and oilseeds. A major AID/USDA research effort designed to develop higher yielding varieties of pulses (lentils, chickpeas, etc), and improved cultural practices are already promising some impressive breakthroughs. As this project moves ahead in both Iran and India, the prospects for raising critically low protein intake levels are improving steadily.

Rapid production increases in a given crop are much more readily obtained as long as a country is deficit in that crop. Unless a country has a strong comparative advantage and ready access to world markets, the rate of production increases will slow down once self-sufficiency is attained. After that, production gains are likely to be a function of growth in the internal market.

The principal benefits of modern, and continually advancing, agricultural technology have yet to be realized in the developing countries. Wrong decisions can, however, slow the rate of progress. If the Indian Government, for example, fails to confront the problem of a large and growing internal deficit in fertilizer, Indian agricultural prospects will be reduced.

Protein and the Quality of Life

To date, very little attention has been given to nutrition as a component of development strategy. And yet economic growth can be meaningful only in terms of developing human resources. Strategy designed to develop people as fully as possible has several components: education, nutrition, health and family planning, among others. Several advanced countries have full employment policies designed to utilize their labour forces as fully as possible. Why shouldn't a country have an adequate nutrition policy to ensure that its people have the opportunity of developing to their full inherent potential?

Increasing Protein Intake

As the role of nutrition in human development becomes clearer, the interest in expanding protein supplies rises. Several independent and widely

varying efforts are now underway to expand the quantity and quality of protein available for human consumption in the developing countries.

One of these is the effort to improve the protein content of cereals through plant breeding. The discovery of high lysine corn at Purdue was one of the first breakthroughs. Corn varieties containing this gene have a protein quality far superior to conventional varieties. Within the next year or so, high protein corn varieties are to be released in the United States, Colombia and Kenya.

Geneticists at the International Rice Research Institute are now giving increased attention to protein content of rice. Of the several hundred varieities tested thus far, protein content has ranged from 7 to 14 percent. The average for rice varieties now grown in Asia is probably about 8 percent. If high-yielding varieties could be developed that would raise this to, say, 10 percent, this alone would greatly increase the protein intake among Asia's predominantly rice consuming population.

There is an interesting parallel between the development of high-protein foods and an earlier situation in the United States. Beginning a decade or so ago many Americans began to realize they were consuming far too many calories for their health. The need to consume fewer calories began to express itself in the marketplace, as a technology for producing low-calorie foods evolved. The result was the creation of a low-calorie food industry, now doing more than $750 million worth of business per year.

In the developing countries the need is not for less calories but for more protein. A technology is beginning to evolve and meet this need in

the marketplace. The result, in my opinion, will be the development of a high-protein food industry in the developing countries, in many ways paralleling the low-calorie food industry in the United States.

Another new technology which may figure prominently in the solution of the protein problem is the low cost synthesis of amino acids, the building blocks of protein. This makes it possible to fortify lower lquality proteins such as in cereals, substantially upgrading their quality at very low cost.

The addition of four pounds of lysine - costing $1 per pound - to a ton of wheat raises the quality of protein to one approaching that of casein, the dominant protein in milk. Bread sold in government-operated bakeries in several major Indian cities is now fortified not only with vitamins and minerals but with lysine as well. In nutritional terms this bread is truly a "staff of life".

What We Have Learned

Over the past few years we have learned a great deal about agricultural development. Perhaps more importantly we have learned to adapt and apply a great deal we already knew.

We have learned within the past few years that it is much better to concentrate assistance efforts than to spread these efforts over a wide range of crops and activities. The propect of a successful assistance effort increases several fold when we select a single crop, often the food staple, such as wheat in Turkey or rice in the Philippines, and then concentrate resources - research, credit, administrative capability, information services, etc. -

behind the effort to greatly expand production of that crop.

Another advantage of concentrating on a single crop with specific and often ambitious targets is that progress becomes quite measurable. This has a positive psychological effect on those working on the program. With specific targets, those working on the project can both derive satisfaction from their accomplishments and analyze and correct short-comings. Concentration also helps gain support, within both donor and recipient countries, for aid programs.

Significance of Agricultural Breakthroughs

The agricultural revolution, already underway in countries containing more than half the population of the less developed world, has significance far beyond its more immediate effect on the food supply. For literally hundreds of millions it is the key to the door opening into the twentieth century.

If the agricultural revolution continues to spread, encompassing most of Africa and Latin America as it now does Asia, then the entire world may be exposed to and affected by progress. Should this happen it will be the first time in history that virtually all of mankind, including the one-and-a-half billion rural people of the less developed world, will be able to move ahead together.

The recent agricultural breakthroughs achieved by several developing countries should sharply accelerate their rates of economic growth. Not only are the rapidly growing farm sectors directly contributing much more to the overall rate of economic growth, but they are also, because of sharp

increases in purchasing power in rural area, stimulating a much more rapid rate of growth in the non-farm sector of the economy.

Successful use of the new high-yielding varieties requires farmers to use a whole new range of cultural practices, a package of new inputs. The new varieties are thus serving as engines of change, forcing farmers to break with centuries of tradition. Once rural populations break with the past in this key area, they become much more susceptible to change in other areas such as education and family planning, and more interested in progress generally.

Perhaps the most significant aspect of the farm revolution is the psychological effect it may have on government leaders in the developing countries. If modern technology should enable the developing countries to solve their food problem - a problem many considered nearly insoluble - then it may give government leaders confidence in the ability of modern technology to solve some of their other difficult problems.

Although the emphasis in this paper has been on the agricultural breakthroughs rather than on the bottlenecks, I do not intend to imply that the food problem is close to being solved. It is not. Moreover, the new and technologically complex era in agriculture will increase - not decrease - the need for technical assistance from the agriculturally advanced countries.

Thus far during the 1960's the population problem has been equated with the food population problem. This may not always be. By 1980 the population problem will more likely be referred to as the employment-population problem. People begin requiring food at birth; jobs are not required for another 15 or 20 years. It is this prospect of large and almost certainly growing

numbers of unemployed in the less-developed countries that poses the principal threat to political stability over the next decade or so.

The current agricultural breakthroughs, however, will buy time with which to slow population growth and to achieve some technological breakthroughs in contraceptive technology. This is imperative. For in the long run our ability to influence the population variable will determine our success in solving the food problem, the employment problem, and many of the other pressing problems we face during the remaining one-third of this century.

The new era in world agriculture is a dynamic one, promising much to many. Old problems are being replaced by new challenges. We must continue to recognize these challenges and respond to them.

BOOK REVIEW

FACTS ON HEALTH PROGRESS, PAHO/WHO Scientific Publication No.66, Washington, September 1968, 50 pages.

This document deals with the progress made towards the achievement of goals in health improvement set for the Americas in the Charter of Punta del Este, 1962. Much of this booklet is very relevant to child health and nutrition.

Several features are particularly worthy of mention:

1. In the section on Child Health the concept of preventable deaths is used. By this the authors mean those deaths in Latin America under the age of 5 years which would not have occurred had the whole region experienced the same mortality rates as the USA. One feels that this is a very useful concept because it enables health authorities in any particular country to estimate what order of target they might reasonably set themselves in successive health plans.

2. Another part of the section on child health deals with the correlation of Socio-Economic Indices and deaths aged 1 - 4 years. It is interesting that of 4 indices selected, animal protein consumption in grms per capita percentage attending school in age group 5 - 14 years, hospital beds per 1000 population, and percentage of population with water service, all correlate fairly closely with the 1 - 4 mortality rate, except the last.

The authors remark that the greatest benefit from improved sanitation may be attained only when there is concomitant improvement in other soci-economic factors.

A section on nutrition shows little if any increase in per capita food production in Latin America, and a deficit in 1966 between food requirements and food supplies for most countries of the region. It also reveals that in analysis of the deaths of children in the pilot stage of the Inter-American Child Mortality Study, one of whose centres is Kingston, Jamaica, it appears that on an average between several centres nutritional deficiency was an important factor in over half the deaths occurring between the ages of 6 and 24 months.

EDITOR'S ANNOUNCEMENTS

Result of Competition for Proverbs Related to Nutrition

The prize of £5 ($24.00 E.C.) for the best proverb which can be used in nutrition teaching is awarded to Miss V. S. Campbell and Miss P. Maynard of Jamaica, who sent a joint entry for the proverb:

"Dog meagre him head big"

This can be used to illustrate how the child's appearance, especially some time after weaning, may indicate how well or poorly he is being fed.

READERS' EVALUATION OF CAJANUS'

Completed questionnaires continue to arrive in the Editor's office, especially since we sent out a second copy with the last issue for those who might wish to reply but might have mislaid their first copy. The results will be published in the next issue of Cajanus in June, and will contribute largely to our current thinking on revisions of the format and contents of the newsletter.

* * * * *

C A J A N U S

Newsletter of

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OUR READERS' VIEWS ABOUT 'CAJANUS'

With the fifth and seventh issues of 'Cajanus' in October and February last a questionnaire was included asking our readers to give us their opinions concerning the past and present performance of 'Cajanus' and to suggest topics which they feel should receive more attention, new features, and in general evaluate the newsletter and suggest improvements. We felt that it is only by keeping in touch with the opinion of its readers that a publication like this can ensure that it fulfils its functions and avoids becoming stale and routine. Furthermore we very much hope, resources permitting, to undertake a major revision of the format of the newsletter beginning with the first issue of Vol. 3 in February 1970, and it seems sensible to collect and take into account our readers' opinions beforehand.

Eighty-one replies were received, almost all anonymous as requested, and from nearly all the countries to which our newsletter is sent, and roughly in proportion to the size of the mailing list for each country.

Purpose of 'Cajanus'

The first two questions asked whether we had succeeded in conveying to our readers what was the purpose of the newsletter, what they understood the purpose to be, and whether the newsletter

fulfilled this purpose from the point of view of their ministry or department.

We and our readers certainly agree as to what are purposes of 'Cajanus'. In order of frequency of response, these are what our readers believe they are:

To provide readers with a forum for the exchange of information and opinion on nutrition (13).

To provide news of nutrition activities in the Caribbean (11), and information on local nutrition problems (10), and on ways of improving nutrition (12).

To make readers aware of the nutritive value of local foods (10).

To provide news of CFNI's activities (10).

Two readers also supplied us with definitions of purpose which we find rather pleasing, namely, "To marry theory and practice in the bed of philosophy"; and "To educate us in the nicest possible way".

As to whether it is fulfilling its purpose as they see it, fifty readers believe that it does, in varying degrees ranging from "very well indeed" to "adequately" or "as well as could be expected".

Other readers find it difficult to decide for their ministry or department; but are satisfied that it fulfils its purpose as far as they themselves are concerned. Others say it does fulfil its purpose but have various reservations, such as that there is danger of preaching to the converted, or that it should go less to administrators and more to economic planners and politicians, or to field workers. (Our mailing list in fact does include quite a proportion of all these categories and of late we have made renewed efforts to include all relevant ministers and chief technical officers, as well as senior administrators). Finally, three readers felt that it did not really fulfil its purpose to more than a negligible extent.

Assessment of the value of articles and features to date

Next we asked readers for their opinion as to which articles published up to that time had made the most impact on them, or had been enjoyed most, or were the most memorable.

We found the replies to this to be most interesting and revealing about our readers main concerns. The articles which were most frequently mentioned were as follows in order of priority:

1. Breast milk and the World Protein Gap - D.B. Jelliffe (No. 3, p.61)
2. The Hidden Cost of Protein - J. McKigney (No. 2, p.59)

3. What the Public Health Inspector Can Do to Prevent Malnutrition - R. Cook & S.K. Reddy (No.5, p.50).

4. The Food Problems of Developing Countries - O.E.C.D. - (No. 3, p.47 and No.4, p.85).

5. Nutrition in Food Policy and Planning - J. McKigney (No.5,p.2).

6. Legume Production in the Caribbean - R.E. Pierre (No.5, p.28).

7. Home Economics in the Caribbean: Time for a Change - S.K. Reddy (No.2, p.36).

8. Patterns of Infant Feeding in Jamaica - W.P.T. James (No.2, p.50).

9. Why Do We Bother to Weigh Children? - E.F.P. Jelliffe (No.1,p.33).

10. Role of UWI Faculty of Agriculture - P. Mahadevan (No.1, p.27).

In addition to these, every article we had published in the first five issues featured in the list of several persons, and almost every article headed the list of at least one person. Thus all our contributors may be assured that in no case did any article fail to evoke some response. Many readers gave us reasons for their preferences, which was also helpful.

In respect of our regular features we asked readers which of the seven they found best or most useful. Most placed them in order of merit, and taking all the replies together this is the order of our readers' preferences:

1. General Nutrition News and Opinion
2. Nutrition News and Opinion from the Caribbean
3. Your Questions Answered

4. News of CFNI Activities
5. Book Reviews
6. Readers' Letters
7. Coming Events

This is as much as the Editor would have guessed, for Book Reviews and Coming Events could be expected to appeal to a somewhat smaller readership than the other features. For 'Readers' Letters' we are entirely dependent on others, and 'Coming Events' is also a difficult column to make comprehensive enough unless we are ourselves kept well informed by the organizers.

Suggestions for new articles and features and other improvements

From CFNI's point-of-view the most fruitful questions were those in which we asked readers for suggestions regarding new features, topics requiring further attention, and for general comments and suggestions for improvement. The replies to these questions were truly valuable, and the Editor is most grateful.

We will try to adopt as many as possible of the suggestions. In particular in respect of features we will give attention to recipes and menus using local low-cost foods of good nutritional value, especially for use in infant feeding, school feeding and for nutrition education purposes. We will also try to introduce regular progress reports on research and service projects underway, if the agreement of appropriate bodies and individual workers is forthcoming.

Regarding the many topics which our readers would like to see receive more attention, some of these have been dealt with in recent issues since the questionnaire was sent out; on others we are currently inviting contributions; and yet others will be discussed at staff meetings later this year and appropriate arrangements made. We note especially the requests for more information on the cost/nutritive value of local foods and for practical advice concerning various kinds of nutrition education.

Where CFNI staff members write articles in 'Cajanus' we have hitherto pursued a policy of anonymity. It is rather difficult to know what is best. Is it somewhat pushful and self-advertising to attach one's name to an article in a newsletter such as this? Or is it a coy and slightly pretentious false modesty deliberately to avoid doing so. We asked our readers what they preferred. 34 said that they preferred to know the author's name, 27 that we should continue our present policy if we wished, and the remainder had no definite views on the matter. Since the majority of those who expressed views felt that the author's name should be given, and because some put forward a practical reason for this, viz., in order that they might be able to discuss the topic further with the author at meetings or by correspondence, we have changed our policy and henceforth all articles will carry the author's name.

Incidentally any material from 'Cajanus' can be used freely and without prior permission in any other publication provided the source and author is mentioned, unless the item is itself taken from another publication. In that case it is best to write to the Editor, 'Cajanus' for advice on the matter.

Over 90% of respondents indicated that their copies arrived regularly and correctly addressed.

Among the improvements which a number of readers suggested were more illustrations (this we will gradually introduce, as in Cajanus 8) and an annual index. This we have prepared for Vol. I (Nos. 1-6) 1968, as a loose insert in this issue and we suggest that readers staple it into the back of No. 6. We will in future produce it annually with the December or February issue. Some readers also suggested that the newsletter be printed rather than cyclostyled, and that the cover be improved. We hope very much that beginning with the first issue of 1970 we will have the necessary resources with which to print 'Cajanus' and this would be an appropriate time to introduce a modification of the cover. Many readers also suggested a much wider circulation. To some extent this depends on printing, for at the moment we are nearing the maximum which we can handle by the present means. An account of our current circulation by countries is appended.

Our readers were really very kind to us, not only in answering the questionnaire so helpfully, but in the rating they gave 'Cajanus'. 55 said it was very good, 23 good and two fair.

Finally perhaps readers would be interested to know the editor's own opinion of 'Cajanus' after reading the replies. Firstly he is convinced that the questionnaire was a very good idea, for it has initiated a real dialogue between the newsletter and its readers. Secondly he believes that 'Cajanus' is indeed fulfilling a useful purpose, but there is ample scope for improvement, which in due course we hope to bring about. In a year or two we will again seek the opinion of our readers in the same way. Meanwhile the Editor would greatly appreciate much more in the way of letters from readers, whether with criticisms or suggestions, expressions of agreement or disagreement, questions for the "Your Questions Answered" feature, or recipes and menus using nutritious low-cost local foods.

We thank all those who have written letters to us hitherto, and of course all who so kindly answered the questionnaire.

Editor, 'Cajanus'

14 May 1969

CURRENT CIRCULATION OF 'CAJANUS'

CFNI Caribbean		
Jamaica	273	
Trinidad	170	
Guyana	100	
Barbados	139	
Antigua	72	
Grenada	64	
St.Kitts, Nevis, Anguilla	39	
St. Lucia	47	
St. Vincent	48	
Dominica	56	
Montserrat	21	
Bahamas	20	
Cayman	10	
Bermuda	4	
Turks & Caicos Islands	4	
Barbuda	2	
TOTAL CFNI Caribbean		1,069
Non-CFNI Caribbean		
Surinam	16	
Puerto Rico	9	
Haiti	7	
Martinique	2	
Guadeloupe	1	
British Honduras (Belize)	1	
Cayenne (French Guiana)	1	
Curacao	1	
Dominican Republic	2	
TOTAL Non-CFNI Caribbean		40
Central & South America		35
U.S.A.		131
Canada		6
U.K.		14
Rest of Europe		19
Africa		8
Australia & South Pacific		6
Asia		7
GRAND TOTAL		1,335

ARTIFICIAL SWEETENERS SAFE, BUT UNRESTRICTED USE FOUND 'NOT WARRANTED'

From News Report, National Academy of Sciences (U.S.A.) Feb. 1969, Vol.19, No. 2, p.3

Diet Cola, Tab, Diet Pepsi, Wink, Diet Rite and other soft drinks using artificial sweeteners such as saccharin and cyclamates, or their combination, are being consumed in ever-increasing quantities by weight-conscious people in the United States.

According to an interim report of an ad hoc committee of the Food Protection Committee of the National Research Council, the available supply of cyclamate in the United States tripled between 1963 and 1967 and is expected to rise to 21 million pounds by 1970. Three-quarters of the total U.S. population, the report estimates, consumes some non-nutritive sweeteners, with the average consumption for a user being 0.1 gram per day. Seventy percent of the artificial sweeteners used today are found in soft drinks.

The increasing use of cyclamates has been the subject of much concern and, as a result, the Food and Drug Administration requested in late 1967 a review of the sweeteners' safety "in light of uses and use patterns and current toxicological knowledge." A similar review was carried out under Research Council sponsorship in 1955, and policy statements on non-nutritive sweeteners were issued at that time and again in 1965.

The interim report of the ad hoc committee, issued recently by the FDA, indicated that some caution needs to be taken in the use of artificial sweeteners, and that "totally unrestricted use of the cyclamates is not warranted at this time." On the other hand, the report stated that intakes of one gram or less per day of saccharin or 5 grams or less per day of cyclamates by an adult should present no health hazard.

The report suggested, however, that acceptable consumption levels be based on body weight - and concluded that daily intakes of 70 milligrams of cyclamate per kilogram of body weight are safe. (The Food and Agriculture Organization and World Health Organization have suggested a 50 mg/kg daily limitation.) Cyclamate content of carbonated soft drinks now on the market, according to the FDA, ranges from one-fourth of a gram to slightly more than one gram in a 12-ounce bottle.

The report also recommended that ranges of intake for artificial sweeteners be established by different age groups with special reference to the extreme upper levels of these ranges and the numbers of individuals consuming such levels.

Numerous investigations on human subjects at different age levels reviewed by the committee revealed only one symptomatic

effect of cyclamates - a moderate softening of stools that occurs occasionally at a daily dose of about five grams or more. The only other reported adverse effect on humans is a very rare occurrence of skin eruptions apparently based on a photoallergic reaction.

The committee called for more comprehensive knowledge of the toxicologic characteristics of the artificial sweeteners. Studies of chronic toxicity now in progress on cyclamates and cyclohexylamine - the derivative of cyclamates in the body - should be completed along with tests now being conducted for carcinogenicity. Investigations should also be done to clarify recent reports of liver changes and blood coagulation defects in animals treated with cyclamates, the committee stated.

The report also recommended that the physiological fate of cyclamates - what happens to them in the body - needs further investigation and that an implied interaction of these substances with drugs should be explored.

The interim report does not deal with a recent finding of FDA scientists that moderate amounts of cyclohexylamine can cause chromosome breakage in some animal cells. It was felt this work was in too preliminary a stage to be properly evaluated. Research being conducted on the subject will be considered in the final report of

the committee, which will be issued when these and other studies have reached a point suitable for further evaluation.

LIFE IN THE NEGATIVE

From 'Nature', Vol. 221, p. 698, Feb.22,1969

Despite recurrent warnings that world population cannot continue to increase at its present rate, there is little sign that the problem is being tackled on a sufficiently serious scale. Dr. Bernard Berelson, president of the Population Council, has recently observed that demographers and economists do not seem to have presented an adequate case to world governments or, if they have, the case has been ignored (*Science*, 163, 541; 1969). It is true that the World Bank and the United Nations are now stressing the economic as well as the medical dividends of birth control programmes, yet, in the entirely respectable belief that population policy is a matter for each country to decide, neither institution is prepared to make family planning programmes an overt condition of economic aid. Nor does it befit industrialized nations, many of whose citizens do not have genuine access to modern methods of birth control, to enforce such programmes on other countries.

It is almost impossible to assess the economic benefits of birth control programmes retrospectively, but almost any method of economic forecasting predicts an extraordinarily high rate of return on money invested in such programmes. Two of the most frequently quoted estimates are President Johnson's remark to the United Nations in 1965 that "less than $5 invested in population control is worth $100 invested in economic growth" and Dr. Stephen Enke's calculation, now revised to a lower figure, that the return on resources used to reduce births could be 100 times greater than the return on resources to increase industrial output.

Predictions of this nature depend on economic models that are necessarily crude; they fall short, it seems, of the incontrovertible evidence that most governments would need to embark on an active population policy. Nonetheless, in the absence of any evidence to the contrary, such predictions demand careful attention. Calculations of the monetary value to an economy of preventing a child's birth may carry the same air of unreality as the megadeath units employed by military planners, but in both situations the quantitative approach, however incomplete, has a valuable perspective to offer. Aid-offering countries who advocate population control are sometimes accused of wishing to make this a substitute for economic aid, but most estimates show that costs of the most widespread birth control programme that is feasible amount to only a fraction of the budgets typical of schemes for

economic development.

A recent study by Stephen Enke and Richard G. Zind of the General Electric Company of the United States suggests that a birth control programme costing 30 cents a year per head of population can nearly double the percentage rise in average income over a period of 15 years (*Journal of Biosocial Science*, 1, 41;1969). The undiscounted return on such a programme, the calculation goes, would be about sixty-five-fold over 25 years compared with a typical four-fold return on investment in capital projects.

Enke and Zind assume a 30 year programme, proceeding at a steady rate, at the end of which half of the country's fertile women are practising birth control. Using an economic model that relates innovations and increases in capital and labour to increased output, they have compared the use of the programme with the case where no birth control is practised. With initial values assumed to be typical of a developing economy, they find that, after 30 years, the GNP - starting at $150 - has increased to $255 per head with the birth control programme compared with $206 a head without it. The extra income represents the value of the programme to the existing population. The undiscounted cumulative benefit works out at a thirteen-fold return on the costs of the programme after 5 years and to an eighty-fold return after 30 years. The value of preventing each birth,calculated from the extra income per head enjoyed as a

result of the programme, is $150 after the first 5 years and $1,366 after 30 years. Discounting at 15 per cent, the future consumption of an infant born in the first year of the programme exceeds its future production by nearly $300. This represents the value of preventing the birth.

By and large, these calculations are of the same order of magnitude as those recently reviewed by Dr. Goran Ohlin (*Population Control and Economic Development*, pp. 107-120, OECD, 1967). Precise estimates in the economics of the unborn, Ohlin concludes, are out of the question. The argument that a birth in an undeveloped country represents an economic loss is hard to reconcile with the indigenous belief that children are economic assets, although in this case the private good may be the public loss. Even so, the value of preventing a birth in a developing economy seems according to several estimates to be about two *per capita* incomes, while the cost of doing so lies between $5 and $10. By any method of prediction, the rate of return on investment in birth control is extraordinarily high.

SUBSTITUTE MILK *

Theory has it that because milk is an essential food, especially for children, and because there is no satisfactory substitute, milk consumption won't change very much whether the price goes up or down. More precisely, economists estimate that if the price of milk went up 10 per cent, people would still drink 98 per cent as much as they drink now. Families living on tight budgets would, presumably, skimp on other foods rather than on milk.

In affluent times and places perhaps that is true. But in a pinch there are acceptable substitutes for high-priced whole fluid grade-A milk. Many household budgeters, for instance, stretch their milk money by using instant nonfat dry milk, either exclusively or as a supplement. It makes up into a beverage that has all the milk nutrients except those of butterfat and costs around 10¢ or 12¢ a quart, less than half the price of whole milk in most cities.

Milk without any fat content doesn't quite taste - or, more accurately, doesn't feel in the mouth - like whole milk.

Children accustomed to whole milk may reject it or may have to be eased into it. And for the first two years of life they probably need the nutritional benefits of whole milk's butterfat.

There is another substitute for whole milk, not quite so inexpensive as nonfat dry milk but, at recent prices, 5¢ or 6¢ per quart less than the original. It looks like milk and often tastes and feels in the mouth virtually the same as milk, and provides milk's nonfat nutrients in the form of skim milk or nonfat dry milk, plus a vegetable oil in place of butterfat. The product is variously labeled, depending on a host of contradictory state laws, as filled milk, melloream and imitation milk (not to be confused with milk-like nondairy beverages - also called imitation milk).

Filled milk, as it shall be called here, has been manufactured in quantity since at least 1916. The Armed Forces have used much of it overseas because of its keeping qualities, which are somewhat better than those of whole milk. Filled milk is a potentially worthy price competitor. Yet is is seldom available to the public.

Creaming the public

The political history of filled milk, like that of margarine before it, stands as a record of the betrayal of the consumer interest. Dairymen and their business allies long ago recognized

the product as a potentially formidable competitor. In 1923 they convinced the Congress to ban filled milk from interstate sale on grounds of adulteration. Congress declared it a cheat and a menace to the public health, and most state legislatures were persuaded to do likewise; the interstate ban continues to this day. Further, 33 states prohibit the manufacture and sale of filled milk within their boundaries.

Here is a classic case of private interests commandeering police powers, under the false banner of consumer protection, to defend themselves against the rigors of honest competition. The consumer interest requires not the banishment of new products but their free access to the market under conditions assuring that they are safe to use, clearly labeled, honestly identified, and priced at whatever level the free market sets.

It took until the early 1950s for lawmakers to clear away the thicket of discriminatory Federal and state tax laws and curbs on artificial colorings that kept margarine from competing favourably with butter. Eventually, the industries interested in selling margarine teamed up successfully with consumers against the dairymen. The victory has made available a nutritionally satisfactory butter substitute costing one-third the price of butter.

The battle to give filled milk complete access to the market stands today where the margarine battle stood 20 years ago. The big national and regional dairy concerns have changed since then, however. They now derive more than half their business from nondairy foods and nonfood products. Sensing a consumer interest in a milk-like beverage at lower-than-milk price, they are gearing up to supply one. The five biggest firms - National Dairy Corp., Borden, Beatrice Foods, Inc., Carnation and Foremost Dairies - have in the past two years been test-marketing, where the law allows and the population seems most receptive, filled milks produced and sold intrastate and branded, respectively, *Seal-test Value 3, Family Treat, Meadow Gold Mil-Kay, Mello and Ditto Drink*. Other brands have been introduced by several big food and dairy companies.

Meanwhile, the pressure is being applied in the courts and the legislative halls to rid the statute books of anti-filled-milk laws. The edible oils and fats industry, grown to the size of an industrial titan, has, of course, a major interest here. As for the farmers and the many local dairy firms whose fate is tied to whole milk - they seem resigned to some legislative setbacks. But they are looking to a second line of defense.

The butterfat hang-up

As dairymen now realize, the price advantage of filled milk grew, unintentionally, from the traditional practice of pricing according to use.

Though milk comes down a single pipeline, so to speak, from farm to factory, the processor pays at least two different prices for it. He pays a high (Class I) price for the milk he pasteurizes and bottles as plain (whole fluid) milk. He pays a much lower (Class 2) price for the surplus flow, which he manufactures into such dairy products as cheese, ice cream and nonfat dry milk.

Maintaining some sort of price level for the farmer is probably a good thing; it recognizes the nation's dairy herd as a vital natural resource and preserves it intact against the superior bargaining power of giant dairy-food companies. But the two-class price system puts a price premium on whole milk - and therefore on butterfat - at a time when butterfat is fast losing some of its importance in the American diet. Americans last year drank 6½ fewer quarts of whole milk per person and 1½ fewer quarts of cream than they did in 1950. Yet our consumption of nonfat milk, in various dairy products, has held steady. Weight-consciousness, the cholesterol scare and possibly high prices, too, have contributed to the

trend away from butterfat.

Under an elaborate system of Federal and state milk marketing orders, farmers in most dairying districts control by referendum the minimum local price that dairy processors must pay for their milk. Their votes in turn are heavily influenced by the interests of the processors who are their regular customers. In 1968, farmers in several areas of the country voted to raise to Class I the price of milk used to manufacture filled milk. And in California, the state legislature last year also reclassified milk bought for making the raw material of filled milk into the Class I price group. The effect of such a move is to raise the price of filled milk to almost equal that of whole milk.

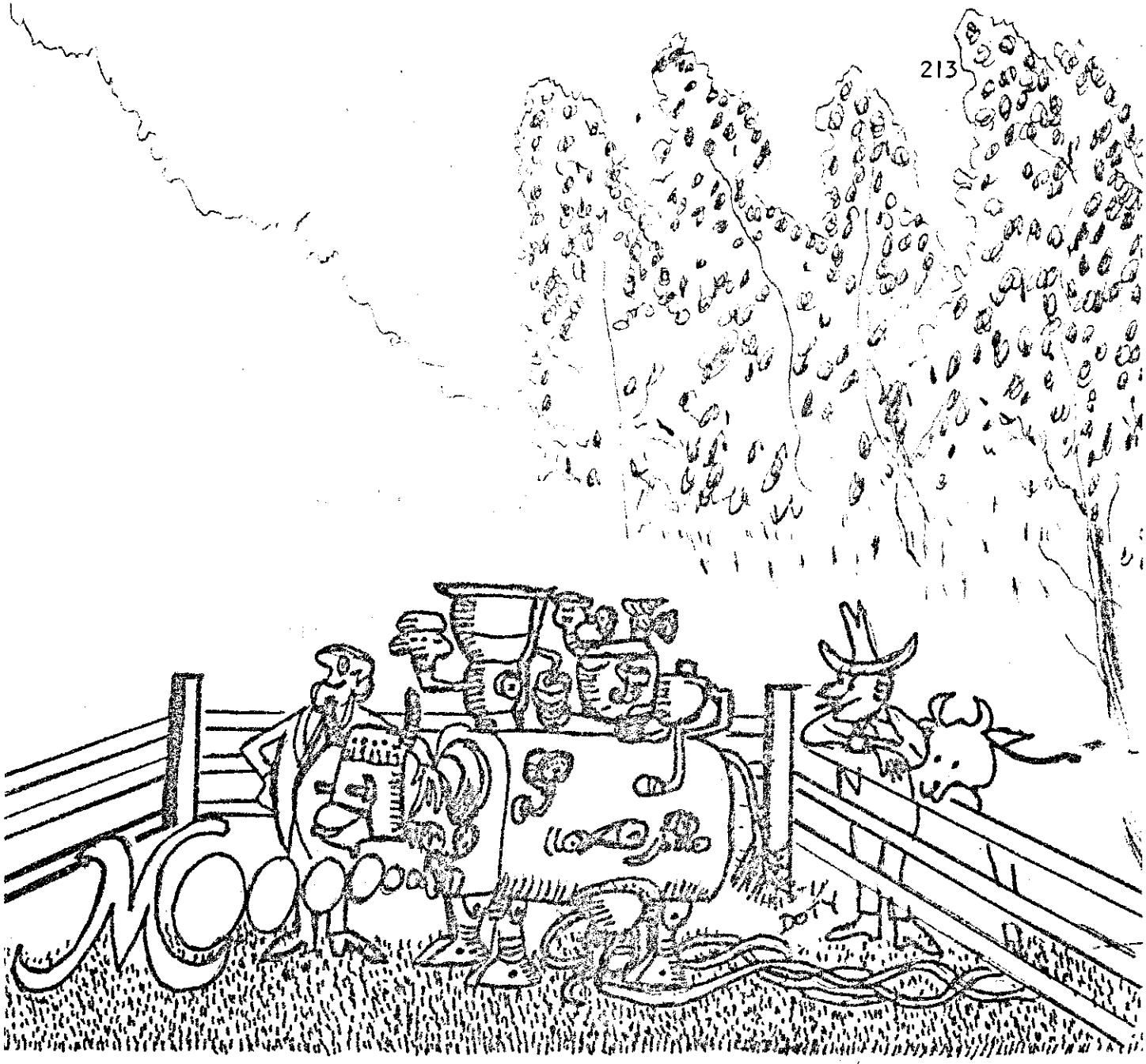
Consumers can only watch helplessly as the price manipulation operates against their interest. It might be otherwise if consumer sovereignty held sway at the retail dairy counter. But there, too, competition has been damped by law or collusive trade practices. Several states, including California, Pennsylvania, New Jersey and Virginia, directly control the retail price of milk, ostensibly to prevent "destructive competition." In most other states, indirect forms of government price regulation and big-dairy price dictatorship keep prices firm.

The supermarket price freeze

The kingpins of the nonaggression pacts in milk pricing are the supermarket chains, which have captured most of the retail milk business once done by home-delivery waggons. Whereas the milkman once wooed the householder with pennies-a-quart discounts, he must now court the almighty supermarket with larger gifts - free refrigerated milk cases, low-interest loans, money under the table or, at the very least, the labour costs of fully stocking and servicing the store's dairy case.

Instead of passing the savings of their efficient bargaining power along to the shoppers, supermarkets typically take the extra profit for themselves. They seldom even advertise milk as a weekend price special. And in cities where gallon-jug milk retailers have cut prices, the supermarkets are likely to ignore the competition, counting on the convenience of one-stop food shopping to sustain a premium price for milk.

To the extent that filled milk may represent lower profits to the supermarket than whole milk does, filled milk may get short shrift at the supermarkets' dairy displays. Diligent shopping in recent months might have turned up one or more of the previously mentioned brands at scattered stores in California, Hawaii, Oregon, Arizona, Illinois, Indiana, Missouri, Ohio, New York and perhaps a few other states where manufacturers have been test-marketing.



Although prices were running 10¢ to 13¢ per half-gallon lower than those for homogenized whole milk, filled milk did not sell very well in many of the tests. The industry explanation, which sounds plausible, is that shoppers found the product names

discouraging. In New York, filled milk must be called "melloream," and in California it must be called "imitation milk." The one name sounds alien; the other, ersatz.

Only in Arizona did sales really soar, capturing about 15 per cent of the whole-milk sales by mid-autumn of 1968. The labels there did not conspicuously attach alien or ersatz names to the product, emphasizing only the fanciful brand names (*Beverage Blend, Mello, Sarival "Go", Shamrock Special "M", etc.*).

What with the confused labeling, sales tests of filled milk must inevitably bring irrational results. Even the most intelligent buyer can hardly understand the nature of the product when it is called by conflicting and unfamiliar or unattractive names, is prohibited interstate and within some states and, where not prohibited, is neither standardized nor particularly well-defined.

The real ersatz

The sharp-eyed shopper for milk substitutes may possibly have discovered another product that looks like milk, comes in a milk-type quart or half-gallon carton and is also labeled "imitation milk." A few milk-like beverages introduced in

the past year or two were completely ersatz. They took hardly anything from the cow except inspiration.

True imitation milk is being made of such ingredients as corn-syrup solids, vegetable fat, sodium caseinate, sugar, salt, artificial thickeners, colors and flavors, and, of course, water. The protein ingredient, sodium caseinate, is derived from cow's milk, and even that can be replaced with soybean protein of almost the same nutritive value. The names of some early brands were *Dairy, Tingle and Country Cousin.*

The consumer seldom gets even whole milk as it comes from the cow; its butterfat is controlled by law or agreement or both. So he can hardly be blamed for looking suspiciously at a product, scratched up from a bunch of laboratory chemicals and corn stalks, that pretends to replace his most nearly perfect food. Yet, consumers may soon be able to thank the inventors of imitation milk for loosing the bonds on the price of real milk.

For the dairymen's vigilante committees of the 1920's did not anticipate this full-fledged challenge to the supremacy of the cow. They neither asked for nor received any Federal ban against true imitation milk. Belated efforts to plug the dike have succeeded in only four states.

The FDA moves in

Imitation milk has one thing going for it that filled milk does not. Because imitation milk is legally salable across state lines, the U.S. Food and Drug Administration has authority to give it a standard of identity. Once that has been done, the product name will become endowed with uniform meaning. Imitation milk in one state will have to be essentially the same as in any other. Nutritionists will be able to judge when and for whom it may be suitably substituted for milk. The prospect is intriguing if only for one reason. An imitation milk was introduced in Los Angeles in 1967 at the deliciously low price of 15 cents per quart.

Last May the FDA did publish a proposed standard of identity for imitation milk. It will take many months and possibly many years for a final standard to be adopted.

Basically, the proposed FDA standard is patterned on the nutritional values of whole milk. The product would be required to contain roughly the same amounts of protein, calcium, phosphorous, vitamin A and riboflavin. Fortification with vitamin D would be compulsory, whereas it is optional (though nearly universal) in whole milk.

If imitation milk met those standards, it would , much more nearly resemble milk nutritionally than one brand of imitation milk that the National Dairy Council analyzed a couple of years ago. It was found to contain only about 20 per cent of whole milk's calcium level, 15 per cent of its phosphorous and 25 per cent of its protein. But even if an imitation milk were formulated according to the FDA standards, it would be only a crude replica of real milk. It would lack significant amounts of the following essential nutrients, all contained in milk: pantothenic acid (one of the B-complex vitamins), pyridoxine (vitamin B_6), folic acid, biotin, vitamin B_{12}, choline, magnesium, chromium, cobalt, manganese, molybdenum and zinc. It is entirely possible for a child or adult to get all those nutrients from other foods in a normal diet. Nevertheless, there is no good reason why they could not be included in imitation milk, and we think the FDA standards should require them.

The FDA proposes to define imitation milk as a nondairy product. It has no other choice under the Filled Milk Act. However, the definition skates around the fact that a casein derivative would be permitted as the protein source even though it comes from cow's milk. The Committee on Nutrition of the

American Academy of Pediatrics has cautioned the FDA that if imitation milk contains casein in any form, the "nondairy" description can be dangerously misleading. According to the pediatricians, as many as 12,000 babies born each year are allergic to the casein in milk. We agree that, for their protection, the label should conspicuously disclose the presence of casein.

Imitation milk would be defined as having not less than 3.25 per cent (vegetable) fat, the minimum required for grade-A whole milk in about half the states. We would suggest in addition a label declaration of the actual percentage of fat. Much more important, the source of the fat should have to be disclosed. The vegetable oil most commonly used in filled milk is coconut oil, which happens to consist of predominantly saturated fatty acids. as does butterfat. Coconut oil is, indeed, the only common vegetable oil with a high degree of saturation. Yet filled-milk labels often say only "vegetable oil" without being more specific.

An FDA rule (now being reconsidered) prohibits label declarations of unsaturated fat levels or health claims based on them. CU would not like to see the ban on health claims lifted. But a physician who prescribes a low-cholesterol diet should be able to warn his patients against eating foods containing coconut oil, with reasonable expectation that information

on labels will let them adhere to their diet. The FDA therefore should require the label on imitation milk to tell which vegetable oil it contains.

Not for infants

For reasons other than its saturated state as such, coconut oil cannot be recommended as a substitute for butterfat in the diets of infants. Some tentative clinical data suggests that coconut oil in filled milk fed to babies may cause diarrhea and low growth rates. Under the circumstances the American Medical Association has called for more clinical studies: we would go further by urging that until coconut oil is proved conclusively safe for infants, imitation milk (and filled milk,too) containing it should carry an appropriate label warning.

The FDA proposal sets one very bad precedent. In contrast to standards of identity in general, this one would permit the sale of imitation milk with less than the specified nutrients. Although the label would have to state that the product is below standard and disclose which nutrients fail to meet the prescribed levels, few people would know what to make of the information.

Voices from both the dairy industry and the vegetable oil sides of the fence are being raised against the name

"imitation milk". The dairy people don't want any suggestion of milk in the name, whereas those with a stake in the product's success prefer a more salable word than "imitation". We favor the word "imitation". It is consistent with labeling requirements on other foods containing substitute ingredients. Truth and honesty dictate the unequivocal identification "imitation milk" for a synthetic product offered as an economical substitute for whole milk or, for that matter, filled milk. Let the product stand or fall on its own merits, including the price.

Moreover, manufacturers should be free, within the limitations of the nutritional requirements, to experiment with flavor and texture. An imitation milk samples by Consumers' Union's food technologist impressed him as leaving a waxy feeling in the mouth. But that was an impression of only one product. There isn't much doubt that a product virtually identical in flavor and texture to milk can be developed. Or a manufacturer may wish to try out a distinctively flavored product, as some margarine makers have done.

The standardization of imitation milk should serve as the needed wedge to break through the legal barriers against filled milk. That product, too, badly needs a national standard of identity. Dairy interests have now begun to realize that they will have to compete on the basis of price, and that they themselves

have a vital stake in filled milk - as a low-priced competitor of imitation milk.

Whole milk too needs the benefits of honest price competition. Both the milch cow and her keepers can become more efficient. According to the National Commission on Food Marketing milk production went up almost 50 per cent per cow from 1945 to 1965 and, with present breeding knowledge, can be raised by 50 per cent again. Milk output per man-hour increased 50 per cent in very recent years, leaving plenty of room for further improvement as dairy farms increase in herd size.

Above all, a breakthrough must come at the retail price level. Instead of keeping the profits of efficient distribution to themselves, supermarkets must somehow be forced to allow the various milk products to compete on the basis of price. Nothing would help more than aggressive selling of low-priced, honestly labeled milk substitutes.

Advice for now

To sum up, nonallergic infants up to age two probably need whole milk, not substitutes. For older children and adults, instant nonfat dry milk is the most economical substitute. It offers complete milk nutrition except for the fatty acids, and

under a new Federal rule it may now be fortified with vitamins A and D.

Filled milk, where legally available, may also be attractively low in price. Families that balk at reconstituted nonfat dry milk will probably find filled milk as palatable as whole milk. Amid a confusion of brand names and legally required generic names, you can identify filled milk by the ingredients listed on the label. Look for a product made of skim milk or nonfat dry milk and vegetable oil.

Imitation milk is still in an experimental stage. It is not sufficiently standardized to be recommended in place of whole milk or the aforementioned milk substitutes. But there would be no harm in trying some now and then just to see how it tastes, and you might wish to check the nutritional claims on the label against the proposed FDA standards, which would require at least the following nutrient values per quart: protein, 34 grams; calcium 1160 milligrams; phosphorous, 880 mg.; vitamin A, 1500 USP units: riboflavin 1.6 mg.: vitamin D, 400 USP units.

AGRICULTURE MUST BE MORE ATTRACTIVE -
Editorial, The Advocate-News, Barbados, 9 April, 1969

Two economic experts have recently made observations about agriculture in our area that deserve not only serious considerations but should be followed by positive action. The first came from Mr. William Demas, the Economic Adviser to the Prime Minister of Trinidad and Tobago, who said in an address before the Canadian Senate Committee that the smaller Commonwealth Caribbean islands by concentrating too much on tourism "are taking the easy wayout and are not really looking at the central question, which is raising their agricultural productivity."

A few days later, Mr. Bishnodat Persaud, a Research Fellow of the University of the West Indies, made the observation that if "we are to maintain agriculture in the West Indies - and we must in view of limited opportunities in other fields - we must take action now to get a modern scientific and highly mechanised agriculture established." Mr. Persaud was at the time addressing an agricultural economics conference.

Although the two speeches were delivered at different times and in different places they both pinpointed a degree of neglect. Mr. Demas' view is that the smaller islands have neglected to pay as much attention as they should to the problem of increasing their agricultural productivity, while Mr. Persaud has emphasised the

neglect on our part to seek new methods in our agriculture, and sees what presently prevails as the subsequent repercussions of this failure.

Human Problem

Mr. Persaud, however, comes nearer to the human problem involved than did Mr. Demas. It is true that the smaller islands, and a number of the big ones too, are concentrating heavily on tourism and this is not only because of Government decisions but the citizens themselves appear to be somewhat disenchanted with agricultural pursuits. Regardless of how ambitious Government planning might be, if the people themselves are indifferent no goals will be aimed at, and few will ever be reached. This is why when Mr. Persaud stressed that fewer people were interested in agriculture because of the inadequate incomes he came closer to the problem than did Mr. Demas.

Mr. Persaud sees the whole agricultural industry being revitalised if the right decisions are taken to improve its efficiency. He strongly backs mechanisation as an important step in ensuring this efficiency and does not see fears of unemployment justified if and when this is done.

Frankly, as the position now stands it is doubtful if we can do any worse if we mechanise. There is definitely a shortage of

labour in certain sectors of our agriculture and the question that will have to be decided is whether we are prepared to take the steps towards mechanising our agriculture or to keep weighing possible disadvantages until the situation becomes almost unredeemable.

Food Production

Mr. Demas and Mr. Persaud, however, see eye to eye on the need for more food production in the area. But whereas Mr. Persaud is optimistic that we could eventually boost our food crops not only for the home market but also for export, Mr. Demas was somewhat pessimistic in his tone though factual in his observations. He said, in reference to the present agricultural situation, "none of the West Indian countries has been able to break this bottle-neck of having a viable domestic agricultural sector."

Whatever is eventually done, something is needed first of all to attract and hold people in the industry. To stimulate this interest the industry must be capable of offering adequate earnings and a worthwhile future and a lot will depend on the efficiency of the industry in this respect. Finally, even though our traditional export crops are facing a somewhat uncertain future, these will have to be retained for the time being while we explore new export lines,

carry out more and more research involving our food crops and attempt increasing diversification. All this could help break the bottle-neck that Mr. Demas has mentioned.

COST OF LIVING INDEX 6% HIGHER in 1968
From The Daily Gleaner, Jamaica, 13th May, 1969.

The impact of devaluation on consumer prices in Jamaica - the official Cost of Living Index - was insignificant in respect of the great majority of Jamaican consumers in the conclusion of the 1968 Economic Survey of Jamaica tabled in the House of Representatives. This does not apply to the minority of households with incomes of the heads above £750 per annum whose pattern of consumption relates mainly to goods not under price controls and whose standard of living is above the average.

Generally, however, the Cost of Living, according to the official index was on the average 6 per cent higher in 1968 than in 1967. The mean annual indices of consumer prices for the Kingston Area and the Rural Areas stood at 109.4 for 1968 compared with 103.2 for 1967, an increase of 6.2 points.

The Kingston Area Food and Drink Index showed an increase of 6.9 points over the December 1967 number, compared with an increase of 5.0 points for the Rural area..

TRINIDAD BEGINS FISH CANNING EXPERIMENTS
From The Advocate-News, Barbados, 1 April, 1969.

The Trinidad Government and a local firm have begun experiments in the fishing industry here.

It involves the canning of sardines and herring, and the drying of shrimp and shark. But a Government spokesman from the Fisheries Division said today they had not yet obtained the right formula for canning sardines and herring. However, he added, they were making headway.

He said: "We were not too happy about the first batch of canned fish we received from the firm. They were not done right."

He pointed out the formula used abroad was kept secret, but some experts in the fishing industry here had a basic knowledge. "Once the technique is perfected the possibility exists of building a canning plant," he added.

The local firm is conducting the fish canning experiments, while Government is testing for perfection.

Government has also been successful in drying shrimp and shark, and recently concluded experiments in preparing flying fish- filetted or whole - for local consumption and export.

If the new project is successful, it is expected that job opportunities will be available for hundreds in the fishing industry here.

NEW AGRICULTURAL COMPANY FORMED
From The Advocate-News, Barbados, 7 February, 1969.

A new agricultural company has been formed in Barbados. It is Sunfarms Limited, a joint venture by the Commonwealth Development Corporation, Da Costa and Musson Limited, and Radclive Manor Limited, each of whom have contributed one third of its share capital of $144,000.

The Company, which will be operated from Codrington Agricultural Station, St. Michael, has acquired a loan capital of $216,000 from the Commonwealth Development Corporation.

Support for the venture also came from the Barbados Government which leased the 84 acre site at Codrington to the company for ten years at a cost of $10,000 per year, with the option of extending the lease for a further 15 years.

Sunfarms Limited will be run by a Board of Directors drawn from the principal shareholders.

The main purpose of Sunfarms Limited is to grow vegetables, plants and flowers for the export markets of Britain, the United States, and Europe; and also to help satisfy local demands for vegetables.

At a Press conference yesterday, the directors pointed out that the new company would not compete with the local production of vegetables, but would supplement their production.

They noted that the scheme had already started as some 15 acres of okras and eight acres of sweet peppers were under cultivation, and added that French beans would be planted at a later date. The directors also noted that sometime in August about 40 acres of English potatoes would be planted for local use.

Pointing out that Barbados was chosen because of its good lines of communication and excellent water resources, the directors said that £600 worth of overhead irrigation equipment would be

installed shortly.

Sunfarms Limited will be managed by Mr. Brian Crosby, who has wide experience in agriculture and horticultural projects. He will also be initially responsible for an extensive training programme which, among school-leavers it is hoped will get underway later in the year.

It is planned to recruit school-leavers with at least three G.C.E. certificates and train them in the specialised business of horticultural production.

The directors envisage that full production would be reached in about five years' time when it is expected, the company would be providing job opportunities for about 300 Barbadians.

It is expected that between 20 - 50 Barbadians will be employed in the initial stages.

CULTURAL FACTORS AND HUMAN LACTATION

by

D. B. Jelliffe

In developing regions of the world today, as in Europe and North America prior to the "milk revolution" of the present century, successful infant rearing for the majority is absolutely dependent on successful breast feeding, as artificial bottle feeding, with animal milk mixtures, is neither economically possible nor practicable for less educated parents with minimal household facilities, such as water supply, fuel and clean storage space.

Despite this, there is increasing evidence of a rising incidence of early and often "unnecessary" lactation failure, mainly with a probable psychosomatic etiology, in many tropical towns, and a few parts of the world in rural areas also. While paralleling the experience elsewhere, there is the increasing change in attitude to the breast as a source of food to its enthronement as the dominant sex symbol.

The results of this trend are disastrous, with an increasing incidence of bottle-induced nutritional marasmus and diarrhoeal disease in infancy, and a progressive wastage of national protein resources, especially adapted to the human baby, in a world engaged in scientific research to produce protein infant foods from previously unused sources, both probable and improbable.

Still further novel attitudes to breast feeding are perhaps likely to arise from such phenomena as the "La Leche League"

on the one hand and the banning of pictures and photographs of bare-bosomed women in independent African nations on the other.

Fortunately, however, the majority of more traditional peoples in rural tropical areas are still little affected by this trend, and the paradox of poorly-nourished peasant mothers producing more than adequate yields of breast milk of normal protein content, often for prolonged periods, is a well-authenticated, but as yet inadequately investigated, phenomenon of great importance to infant feeding in developing regions.

Scientific consideration of human lactation has been principally concerned with mothers in the nutritional, psychological and social circumstances found in industrialized and technically developed parts of the world. Only in recent years has research, principally by Gopalan and the Hyderabad school of scientists, been concerned with physiological, nutritional and genetic aspects of lactation in poorly-nourished women in the tropics.

However, in addition to metabolic nutritional considerations, which plainly merit urgent, detailed and practically-oriented research in the innumerable "experiments in nature" found in different human communities, it is also necessary to the scientific student of lactation to be aware of some of the great variety of customs associated with breast feeding in various traditional cultures. The range is, of course, very wide, and the present

short account consists only of certain generalizations concerning *types of practice* which are both commonly of importance and often little appreciated in Europe and North America.

Commoner practices

1. Technique of breast feeding

In most traditional circumstances, there is no particular "technique" followed. The first lactation is usually early (e.g. 18-20 years of age) and babies are fed permissively "on demand" at irregular intervals and with the mother and child in a variety of positions relative to one another (e.g. while carried on the mother's back with the pendulous breast reaching through the axilla, or while lying beside each other). Full emptying of the breasts can probably be only rarely achieved, although, equally, they are almost never "full".

The Western practice of "burping" does not appear to be practised elsewhere. It may be related more to the excessive air-swallowing that can result from mechanically faulty bottle feeding, and certainly has become overlaid with considerable ritual mystique.

Preparation of the breasts, as by massage, applications to the nipple or expression of milk, is not usual, either antenatally or during lactation.

2. *Commencement of breast feeding*

Most often neonates are put to the breast immediately, although in some cultures the colostrum may be discarded (e.g. parts of Pakistan). Local "tests" of a milk's suitability for the infant may be carried out (e.g. "the finger-nail test", the colour, the ability to attract flies, etc.). In parts of New Guinea, it is not rare for milk from only *one* breast to be considered unsuitable, so that feeding is unilateral and the unused breast is small and is stated to produce little milk.

In some communities, special foods may be given to mothers in the puerperium or even for the first few months of lactation, but this is unusual.

3. *Length of Lactation*

Most commonly breast feeding is continued until the next pregnancy occurs, and in some traditional, often polygamous, communities, especially in Africa, various social techniques were employed to assist in adequate family spacing (e.g. by the woman not living with her husband until a culturally defined period, as, for example, when the child could walk or had a certain number of teeth). If a subsequent pregnancy did not occur, often children return for an occasional suckle, especially if anxious or frightened, up to five years of age or more.

Sometimes a "physiologically defined" age to stop breast feeding may be culturally recognized with no relation to subsequent pregnancy. Thus, in ancient Polynesian Hawaii the young child's ability to pick up and throw away two large smooth round stones, symbolizing the mother's breasts, was the test applied.

Probably rather rarely, as, for example, among the Karamojong of north-east Uganda, breast feeding may continue through pregnancy and "weaning" is delayed until after delivery.

The stopping of breast feeding (sometimes ambiguously termed "weaning" in English and more correctly *sevrage* in French) can be carried out abruptly or gradually. Various unpleasant deterrents may be used on the breast, especially bitter or "hot" substances, such as quinine or red pepper. Sometimes an actual geographical separation may occur with the infant sent to stay with a relative. Occasionally a compensation is attempted for this nutritional and psychological trauma, as by the feeding of the child with special delicacies (e.g. brightly painted boiled eggs in rural Egyptian villages).

4. *Induced lactation and galactogogues*

The ease of lactation in most rural traditional communities is well known and is emphasized still further by such phenomena as

the "communal breast feeding" of the San Blas Indians of Panama, where young children are mainly nursed by their mothers, but also receive casual feeds from other women, including aunts and grandmothers, in the extended families in which they live.

Induced lactation has been described in Asia, Europe and, principally, Africa. Most usually a woman is selected who has had a baby in the past (but often years previously) and who is not beyond the menopause. Techniques used vary, but are based principally on allowing the baby to suckle as often as he can, together with massage of the breasts and the use of herbal medicines by mouth. It has been shown that after some days breast milk of a low normal protein content can be produced in moderate volume even from poorly-nourished grandmothers.

Failure of lactation is probably rare under traditional circumstances, probably because poor lactating strains or those with deformed nipples would tend to die out. Its grave consequences (in the absence of a substitute source of breast milk) are usually appreciated. This is reflected, for example, by the extreme practice in New Guinea of burying the newborn baby with the mother who had succumbed during childbirth. Conversely, psychological support for the mother's lactation may be given, as by the Chagga of Tanganyika, for whom it is customary for visitors

to the newly-delivered woman to say "May the baby have milk abundantly", to which the parents reply "Thank you, he is replete with milk".

Occasional poor lactation must occur in all groups, as galactogogues are always to be found in indigenous pharmocopoeias. While some of these may perhaps have an actual pharmacological effect, the wide variety employed in various communities with apparent success suggests that psychological effects may predominate.

In particular, some of the preparations employed may have a "sympathetic magic" basis - a milky-coloured herbal brew being expected to produce a flow of mother's milk. A technique of this type was used in ancient Polynesian Hawaii:

> "The male god Ku, symbolized by the right-hand side of the body, and his wife Hina, represented by the left side, were appealed to. As part of the ceremony a length of sweet potato vine was plucked with the right hand for Ku and another with the left hand for Hina. These were then tied around the woman's neck with the milky sap oozing out of the broken tendrils. This process was repeated each day and the sympathetic magic effects of the flowing milk-like sap must have had

very considerable psychologic value, so necessary for the confidence that is the main factor in success or failure in human lactation."

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YOUR QUESTIONS ANSWERED

Q. Is there any justification for the theory that yogurt is more nutritious than the milk from which it is made? That is, that the addition of lactobacilli increases the nutritional content?

A. In general, there seems to be no good reason to believe that yogurt is more nutritious than other equivalent non-fermented milk solids products. If, however, prior to fermentation, enough non-fat milk solids are added to exceed the total milk solids content of fluid milk, the nutritive value would be increased.

The addition of lactobacilli does not, in our opinion, increase the nutritional content of milk.

Another question that might be asked is: what benefits, aside from those of classical nutrition, do lactobacilli provide? Some clinical nutritionists believe that continually implanting beneficial organisms in the intestinal tract provides a wholesome microflora; thus, lactobacilli could keep the tract clean by suppressing the growth of toxin-producing microorganisms.

This concept has been challenged by other nutritionists as not having been proved. However, it is known that the cramps and diarrhoea which result from continued treatment with an antibiotic can be ended quickly by consuming buttermilk, yogurt, or a capsule containing a large population of lactobacilli.

This rather extreme example is evidence of the importance of having a beneficial assortment of microorganisms in the intestinal tract.

The lactobacilli do improve the keeping quality of dairy products. The lactic acid which they produce is a wholesome preservative which suppresses the growth of the putrefactive organisms in milk. This can be an important advantage in areas where milk has to be kept under unfavorable conditions.

(from League for International Food Education (L.I.F.E.) Newsletter, March, 1969).

Q. Do you know a way of using the banana flower (or terminal bract)? I understand it is eaten in the East, but I cannot find out how it should be prepared. The 'flowers' lying inside in rows seem pleasantly edible after soaking and cooking. What nutritional value would they have? Naturally they are freely available in the banana-growing islands. (From Dr. V.H. Usborne, St. Vincent).

A. The banana flower is used to a fair extent in South India. The flowers of some varieties are more bitter than others. As it is not possible to differentiate the flower of one variety from another, the usual practice in Indian markets is for the prospective buyer to sample a little of the flower to ensure it is not too bitter before buying it.

Flowers of three varieties commonly found in Jamaica, a) Lacatan, b) Valery and c) Dwarf Cavendish have been tested and Valery has been found to be least and Cavendish most bitter.

We are unable to locate any analysis of the flowers, but have reason to believe that like most actively growing parts of a plant, would constitute useful sources of vitamins and protein.

The individual flowers under each bract is what is eaten. The stigma of each flower is discarded and the rest of the flower used. Some people prefer to remove all the bitter element by boiling initially in a fair amount of water and discarding the water.

Following are two popular recipes:-

Banana Flower Fougard

Ingredients -

Banana flower chopped into half inch lengths	1 cup
Boiled gungu or red peas	1 cup
Fresh grated coconut	½ cup
Onion (chopped)	1 medium
Mustard seeds	½ teaspoon
Oil	2 tablespoons
Salt	

Method:-

Boil the banana flower and set aside. Heat oil in saucepan, add mustard seeds. When seeds crackle add chopped onion and fry till pink. Then add peas and banana flower and cook for 5 minutes. Add salt to taste and lastly the grated coconut. Stir well and serve.

Banana Flower Bhajjis

Ingredients -

Split peas	1 cup
Banana flower chopped into half-inch lengths	1 cup
Onion	1 medium
Oil	2 cups
Salt	

Method:-

Soak peas in water for 6 hours. Drain and grind until fine. Add banana flower which has been previously boiled until soft. Add finely chopped onion and salt to taste. Mix well. Take a heaped teaspoonful, make into a ball, flatten and fry in hot deep fat until brown.

While in principle one should encourage maximum utilisation of all available food resources, the time factor involved in the preparation of this food item is so great that it may not prove to be very practicable in the Caribbean context.

Bananas, avocado, passion fruits, melons, dates and oranges are among fruits which will be under discussion *at a conference on tropical and sub-tropical fruit* to be held in London September 15 - 19.

Forty experts on tropical fruit growing, harvesting, handling, storage processing and marketing will address delegates - who will include West Indians. The conference is being organized by the Tropical Products Institute, London, part of Britain's Ministry of Overseas Development.

Dr. J.O. Yankey, Superintendent of Agriculture, Dominica, will discuss the scope for the development of processing industries in the island and it is hoped that Professor E.A. Tai, of the University of the West Indies, will speak on the propagation of avocado.

There will also be lecturers from East Africa, India and the Middle East speaking on "Pineapple Cultivation", "Mango Nutrition", "Soil Fertility and Crop Nutrition" and "Nutritional Studies on Citrus and Banana".

Post-harvest

The main emphasis at the conference will be on post-harvest problems. Most of the speakers on post-harvest changes, handling and transport will be from Europe and the United States.

Mr. D.G. Coursey of the Tropical Products Institute will discuss "Low Temperature Injury in Tropical Fruit."

Other speakers will deal with such subjects as "Controlled Atmosphere Storage," "Fungicidal Treatment of Fruit" and "Metabolic Changes of Fruit", "Containerisation", "Problems of Transport and Storage of Florida Citrus" and "Air-freighting of Tropical Fruit."

The economics and marketing section will be particularly concerned with marketing countries such as Britain, the Common Market area and North America. In addition to the well established tropical fruits, trade in less common tropical fruit will be discussed by a director of a leading London firm of fruit and vegetable importers.

Application forms to attend the conference may be obtained from the Scientific Secretariat, Tropical Products Institute, 56-62 Gray's Inn Road, London, W.C.1.

* * *

On Friday, 11th July, to Sunday, 13th July, 1969 a seminar sponsored jointly by the Jamaica Agricultural Society, Ministry of Agriculture and Fisheries and the U.W.I. will take place at the

Golden Head Hotel, Oracabessa, Jamaica.

The seminar will review the basis for the establishment of an agricultural policy in the light of world agricultural trends, Jamaica's needs and the resources available.

Further details can be had from the Secretary, Jamaica Agricultural Society, Kingston.

NUTRITION AND PRODUCTIVITY*

by

J. McKigney

In recent years there has been an increasing awareness of the health and economic implications of malnutrition of the young child. Rapid population increases, reduced food supplies and changing cultural patterns on a worldwide basis have resulted in the problems of infant malnutrition becoming sufficiently important to be of primary concern to many governments and international agencies.

A malnourished child is usually the victim of an unsatisfactory home situation in which nutrition of the other family members is also far from adequate. Although not clinically malnourished and, indeed, even apparently well-fed, their health and productivity may be greatly diminished by a poor diet.

The working efficiency and productivity of older family members - whether schoolchild; housewife; commercial, industrial or agricultural worker - is reduced by improper nutrition, because:

a. the body will protect itself by avoiding effort, resulting in a lack of energy and drive;

b. the quality of work suffers and accident rates are higher;

c. the individual's resistance to disease is lowered, resulting in more sickness and absence from work.

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* Memorandum issued by CFNI on the occasion of the 50th Anniversary of the International Labour Organization, and World Health Day, April 7, the theme of which was "Health, Labour and Productivity."

Thus, apart from health and humanitarian considerations, there is a direct economic relationship between nutrition and the productivity of a population. Nevertheless, in many countries little consideration has been given to the possibility of improving work performance of industrial and agricultural workers through a better diet.

Though other factors also greatly influence productivity, the beneficial effects of good nutrition on workers has been determined by many studies carried out in actual employment situations. Depending on the deficiencies of the previous diet, labour output was increased by 30 - 80%, accompanied by improved health, less absence from work, and a reduced labour turnover rate.

Contrary to general belief, a man performing hard physical work in a tropical climate requires a higher intake of protein and calories than his counterpart in temperate areas. This is explained by the high sweat loss of the industrial and agricultural labourer. Unfortunately, the diets of these workers in the Caribbean tends to be low in both protein and calories. If the diet is based principally on starchy foods it almost certainly will provide inadequate nutrients for maximum work performance.

Where this is the situation, the most direct means of improving the worker's nutrition is through an employer-sponsored canteen which provides one or two meals daily, free of charge, or subsidized, or at cost. Employers who have measured labour productivity before and after installation of a canteen have usually found that the cost is more than compensated by increased by increased productivity.

It is often said that the largest single obstacle to the developing nations is the need to do everything at once. This refers mainly to the enormous investment requirements of industrialization. In seeking the national goals of greater efficiency and productivity, essential investments in man should not be overlooked. The small investment needed to improve nutrition can produce generous returns.

* * * * * * *

CAJANO QUOTE

Wilhelmina Lombardi, FDA consumer specialist in Atlanta, talking about $500 million oldsters spend annually on sea water and various food items considered quackery: "They've grown old; they don't feel very well, they are lonely... Often they don't have the protection of the family...many elderly people are afraid of death-they are terminal citizens, and they know their time is running out. They are looking for something that will make them feel better. You can see why they would be easy victims for the food quacks."

CFNI NEWS

The main activity of CFNI continues to be the course of the Diploma in Community Nutrition. On April 17 the Jamaica part of the course concluded. Much to our regret, Miss L. Warren, Deputy Superintendent of Public Health Nurses, Guyana, was compelled to abandon the course due to illness. We will miss her very much. Happily she is now much better than she was and has been able to return to Guyana for convalescence.

On 18th April the students and staff went to Haiti. There they visited the Albert Schweitzer Hospital at Deschapelles, a terracing scheme at Fort Jacques, the factory where AK-1000 is processed, Mothercraft Centres in three districts, and the University hospital. To say that we found it very interesting would be an understatement; inspiring would be nearer the mark. There were several instances, the Mothercraft Centres in particular, in which so much had been done to combat malnutrition with such minute resources.

On 23rd April the students arrived in Puerto Rico, where nutrition efforts in very different circumstances and of quite another kind were seen. In particular several Isolated Village Projects were visited, and here too the students had a valuable educational experience.

In both Haiti and Puerto Rico the students gained ideas concerning ways in which the active participation of the community in betterment programmes could be obtained.

On 1st May the class arrived in Barbados, where it currently is very hard at work in the Barbados National Nutrition Survey, a joint Government of Barbados/CFNI project. All students are having experience of all the main sections of the survey, including socio-cultural interviews, medical and anthropometric examination, and family and vulnerable-individual food consumption studies.

The Ministry of Health is providing the services of Public Health Inspectors - who efficiently carried out a pre-survey enumeration of the sampled families - of a sociologist and of Public Health Nurses. The Ministry of Education has seconded to the survey two nutritionists and eight teachers of Home Economics. Nurses from the Child Care Committee are doing sterling work and several international experts other than CFNI staff are also helping. The Ministry of Agriculture also is providing the services of an agricultural economist and all ministries are providing transport. The work is long and hard, with many revisits necessary to the homes to find people who were out at work or at school earlier in the day. However the public

are really very kind and co-operative and we are hopeful that in the final report there will be much of value to all persons and departments concerned with nutrition in Barbados.

Matters concerning the analysis of the data are still on schedule. We require to use the large modern computer of the Cane Sugar Producers in Kingston rather than the smaller UWI machine, and we have very experienced and skilled computer programmers, though even they say that this is the most complex and extensive survey they have handled.

The survey will be completed on June 1, and the class will then transfer to Trinidad for six weeks for further lectures, seminars and field visits prior to exams before returning to their home countries to undertake their three-month research projects which will complete their requirements for the Diploma.

In respect of the proposed Caribbean-wide investigations into current infant feeding practices, CFNI has now sent out specimen questionnaires to all participants in the Infant Feeding Working Party of last December. Some of the participants will be using parts of this questionnaire in enquiries into this subject in the various islands and territories. Some diploma students

have also chosen research topics concerning or touching closely upon the feeding of infants and young children. In addition there will be several studies made by CFNI staff members, in particular Dr. S.K. Reddy, in co-operation with local bodies in Jamaica, St. Vincent, St. Lucia and now Barbados.

It is CFNI's desire to coordinate the collection first of factual and up-to-date body of knowledge concerning many aspects of the current situation in regard to infant feeding which accounts for the fact that CFNI's public utterances on this topic are not dogmatic. We desire rather to consult with all pediatricians and nutritionists in the area on the basis of such data, much of it jointly acquired, before enunciating guidelines regarding infant feeding. But the provision of such guidelines, authoritative and collectively arrived at, is a duty which CFNI feels it should perform as soon as possible.

* * *

"CARIBBEAN FARMING"

The second issue of "Caribbean Farming" has recently been distributed. This excellent magazine - published quarterly - has the primary objective of making available to farmers the results of relevant research and experiment. However, articles such as "Caribbean Cooking", "Computers and the Farmer" and a book review in the current issue amply cater to the reader with broader interests.

Subscription rates are 16/8d or $4.00 E.C. for 4 issues. Write to Caribbean Farming, c/o Faculty of Agriculture, U.W.I. Kingston 7, Jamaica, or St. Augustine, Trinidad.

BOOK REVIEW

from 'World Health', April, 1969

INTERACTIONS OF NUTRITION AND INFECTION, by N.S. Scrimshaw, C.E. Taylor & J.E. Gordon, Geneva, 1968 (World Health Organization: Monograph Series, No.57), 329 pages. Price: £2.14. 0., U.S.$9.00

All doctors and most ordinary people know that an undernourished child is more likely to catch an infectious disease, but it is perhaps less widely recognized that infections may trigger off serious malnutrition. This is particularly the case in lesser-developed countries where, to take only one example, measles in under-nourished children is often followed by kwashiorkor, a serious and widespread deficiency disease.

Yet only recently have the complex interactions between nutrition and infections been studied in detail. The vast body of information now available on this subject has been summarized and evaluated in a new publication of the World Health Organization prepared by three distinguished workers in nutrition and public health in consultation with 17 specialists in various countries.

Many examples are given of how malnutrition, and especially deficiencies of protein and certain vitamins, interfere with the protective barriers that the body normally puts up against the onslaughts of infection. Vitamin A deficiency alone is a factor causing greatly increased susceptibility to almost every

known infectious disease.

One point repeatedly brought out is that malnutrition and infection can be mutually aggravating, and produce more serious consequences for the sufferer than would be expected from a summation of the independent effects of the two. In such cases the result is often fatal.

A striking example is the remarkable severity of diarrhoeal disease among "weaning" children in lesser-developed countries, and a whole chapter of the book is devoted to accounts of detailed studies of this situation. Weaning entails two threats to the child's health. First he is exposed to contaminated food after safe breast milk; second, he gets food of poorer quality and often insufficient in quantity for his growing needs. In one study it was shown that, although rates of diarrhoeal disease more than doubled at the beginning of the weaning period, the highest rates prevailed during the time when weaning was being completed and the child transferred to a completely independent diet. Furthermore, malnutrition resulting from the poor weaning diet increases the chances that acute diarrhoeal disease will prove fatal.

"What is definite is that the diarrhoeas occurring at the time of weaning are by far the most important aspect,

numerically and as a cause of death, of the general problem of diarrhoeal disease in less developed regions." The authors conclude that "where both malnutrition and exposure to infection are serious, as they are in most tropical and developing countries, successful control of these conditions depends upon efforts directed equally against both."

* * *

C A J A N U S

Newsletter of

THE CARIBBEAN FOOD AND NUTRITION INSTITUTE

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CONTENTS

FOOD IMPORTS: MILK

by
Dr. J. McKigney

Although the per caput consumption is still low, the West Indies represents a large and rapidly growing market for dairy product imports. Concerned by the foreign exchange requirements of dairy imports, the governments of numerous territories in the Commonwealth Caribbean have in recent years undertaken a variety of programmes to stimulate milk production.

Current Trends

Some idea of the magnitude of the gap between demand and local supplies can be apprised from data concerning five territories for the years 1960 and 1966.

Table I

Country		Dairy imports expressed as whole milk equivalent (1000 lbs)	Local Milk Production (1000 lbs)	Cost of Imports ($000 E.C.)	Imports-% of total supply
Barbados	1960	53,189	19,300	3,859	70
	1966	78,142	(1965)15,100	4,837	85
Guyana	1960	54,022	N.A.	4,391	
	1966	76,776	34,430	4,364	69
Jamaica	1960	235,241*	77,500	11,578*	75
	1966	364,451*	100,000	16,891*	78
St.Vincent	1960	7,457	500	392	94
	1966	12,457	600	668	95
Trinidad	1960	217,944	31,240	13,539	87
	1966	250,667	46,420	15,295	84

* excluding other dairy products (not specified)

Thus, although milk production was apparently rising steadily in four of the five territories, the total combined cost of dairy product imports rose 24% from E.C. $33.8 million to $42.1 million in the six year interval*. There was a 38% increase in quantities imported (expressed as whole milk equivalent) which, combined with increased production represent more milk available per person in 1966, in spite of population growth.

Dairy Products and Nutrition

Traditionally, an increase in per caput consumption of dairy products has been equated with improved nutrition. This stems from the concept of milk as "nature's most perfect food." From a nutritional point of view, governments' interest in achieving and maintaining adequate supplies of dairy products relates particularly to milk as a source of protein. The other nutrients in milk - minerals, vitamins, fats, sugars - are also important but can more easily be substituted by other foods than can milk protein. This can have an important bearing on policy and economic considerations relating to milk supplies, as can be seen in Table II

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* Imports by Trinidad plateaued in 1967 and 1968, and are now decreasing.

Table II

Nutrient Content of Selected Dairy Products

Product	Calories	Grams Protein	Grams Fat	Grams Carbo-hydrate	Approx.Retail Cost/ 20 grams protein
	(per 100 grams weight)				
Fluid milk	65	3.5	3.5	5.0	E.C.$ .22¢
Evaporated milk	138	7.0	7.9	9.9	.28¢
Sweetened condensed milk	320	8.1	8.4	54.8	.25¢
Dry whole milk (DWM)	506	26.0	30.0	34.0	.25¢
Dry skim milk (DSM)	306	36.0	1.0	51.0	.06¢
Milk-based infant food	510	16.9	24.0	58.0	.55¢
Cheddar Cheese	398	25.0	32.2	2.1	.15¢
Butter	716	0.6	81.0	0.4	8.00

Twenty-five percent of milk product import costs relate to butter. As far as nutrition is concerned this product should be classified separately from the others as it provides essentially no protein, and it can easily be substituted at much lower cost by locally produced vegetable fats. Insofar as dry whole milk (DWM) and cheddar cheese are concerned, the basic reason for the increased protein cost in these products as compared with dry

skim milk (DSM) lies in their butterfat content. Thus, except for vitamin A content, it is possible for one million pounds of DSM and 300,000 pounds of vegetable oil to replace the nutrients in 1.3 million pounds of DWM, thereby permitting a foreign exchange saving of $750,000 and also an economy of $800,000 or more for the consumer.

This leads to a recent and interesting development in milk processing - "filled milk" and "reconstituted milk." While evaporated milk, sweetened condensed milk and the milk-based infant foods were formerly made from whole milk, these products are now often prepared from DSM and vegetable oils or anhydrous butterfat purchased on the world market. Although such "filled" and "reconstituted" milks are equivalent nutritionally to the natural product, proportionate benefits of lower ingredient cost are frequently not passed on to the consumer.

The assignment of high economic value to butterfat in dairy products came about hundreds of years ago when butter was the highest quality fat available. This concept was reinforced in the early 1900's when it was learned that milk fat was one of the few available sources of vitamin A during the winter months in continental areas. The situation is much different now because less expensive and entirely acceptable vegetable oil products,

fortified with synthetic vitamin A, are competing strongly with butter. In fact, there is a huge world surplus of butter. The larger producing countries had carry-over stocks of 600,000 tons in 1968, nearly triple the 1966 carry-over.

Yet, in most countries the price paid to the a dairyman is related to the butterfat content of milk, not the solids-non-fat portion, which is an index of the protein content. Emphasis on high fat content in milk conflicts with the concept of this being an important source of protein. Also, the premium paid does not always represent increased profits to the producer. Fat is a concentrated source of energy, thus cows producing milk with a high butterfat content require more concentrates for each pound of milk produced.

Problems accompanying self-sufficiency

Although the data in Table I leave the impression that local milk production will not entirely replace imports for many years to come, it is interesting to speculate how this would affect the consumer from the point of view of nutrition and economics. First of all, government and the producer would tend to favour processing and distribution of milk in the form of fluid milk as this is the outlet which offers highest prices to the producer and requires less subsidization. Unless

the West Indian producer becomes efficient enough to compete with the very efficient (and often subsidized) producer in other countries, the manufacture of evaporated milk, sweetened condensed milk, DSM, DWM, cheese and butter would either have to be heavily subsidized by government or the consumer would have to pay much higher prices than these products command on the world market. This is because the producer (unless subsidized) is always paid a low price for milk for manufacture.

Dry skim milk is by far the lowest cost source of milk protein in the Caribbean. Table II shows that the protein in other dairy products costs from 2.5 to 10.0 times as much. Therefore, it would seem that national food and nutrition policy should encourage the use of DSM among low income families and ensure that supplies of this, or alternative products, be constantly available. This poses another dilemma for advocates of self-sufficiency in dairy products as DSM is sold on the world market at artificially low prices (as low as 11¢ E.C. per pound recently) as a by-product of subsidized butter production. As in the case of butter, surplus stocks of DSM are growing and prospects are that world prices will remain low.

Additional Considerations

Another factor which soon will have to be reckoned with throughout the Commonwealth Caribbean is the sale of "reconstituted"

milk, "filled" milk and "imitation milk"* in the same type of container as fresh milk. The ingredients of imitation milk are water, corn syrup solids, sugar, vegetable fats, a protein source, vitamins, salt and additives to improve flavour or functional characteristics. Sodium caseinate or soy protein are the proteins currently used.

These fresh milk substitutes are now widely marketed in the U.S., usually at a price about 20% lower than real milk. They have been available longest in Arizona, and now represent over 15% of whole milk sales in that state. In New York, a frozen "filled" milk concentrate which provides milk at about 50% the regular cost has recently been placed on the market.

The milk substitutes have already invaded the Caribbean. They have been readily accepted by the Puerto Rican consumer, being sold at 22¢ U.S. per quart, compared to 28¢ for real milk. There, the milk producers have attempted to legislate the prohibition of these products. The consumer and nutrition groups, on the other hand, have requested that legislation guarantee free sale as long as advertising is not deceptive and that rigid standards of sanitation and nutritional content be met.

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* See Cajanus 9, pg. 206.

Significantly, although the U.S. dairy men have lost an estimated one-fourth of their potential market to substitutes in the last 25 years, they have only recently agreed on concerted action. Even more significantly, they have decided to fight the substitutes via a pledge of 1% of gross sales ($55 million U.S. per year) for research and aggressive marketing of natural dairy products rather than request protective legislation.

Conclusion

Although there is a growing gap between supply and demand for animal protein in the world, it appears that for several years hence, dairy imports will be required by the Caribbean territories and, price-wise, will be stiff competition for the local dairy industry. Nevertheless, the efficient dairyman will undoubtedly continue to have a substantial and growing market for fluid milk of good quality, if sold at a reasonable price. Being an efficient converter of forage into both milk and meat, the cow will certainly do her part, if given a chance.

From the long range point of view, governments of the larger territories may find it desirable to consider a dual approach to the milk product supply situation. Promotion of increased (and more efficient) milk production for the fluid market would be continued, accompanied by further diversification of agriculture into those

crops which are potentially the most efficient producers of total nutrients, among which are the two primary sources of ingredients for the manufacture of milk substitutes - coconut and the soya bean. These crops could in turn, produce many raw materials and by-products which would permit considerable intensification of the dairy industry and a simultaneous reduction in imported feedstuffs.

Current imports of milk products and the appearance of milk substitutes on the horizon may appear to be a threat to dairy development programmes now underway in the Caribbean. Nevertheless, if considered rather as a challenge, they can be utilized to the advantage of government, the dairy industry and the consumer.

Assistance of the following persons is acknowledged who provided Dairy Import and Production Data: Barbados - Mr. John Cropper, Research Assistant, U.W.I.; Guyana - Mr. B.O. Bowman, Statistical Bureau, Ministry of Economic Development; Jamaica - Mr. L. Latibeaudiere, Planning Unit, Ministry of Agriculture & Fisheries; St. Vincent - Mr. Hugh McConnie, Department of Agriculture, Ministry of Trade, Production, Labour and Tourism; Trinidad - Mr. Charles John, Economic Division, Ministry of Agriculture & Fisheries.

ITEMS FROM A CORONER'S COURT REPORT IN MONTEGO BAY
From the "Daily Gleaner," Jamaica, June 6 1969

The deaths of 15 persons were enquired into in the Coroner's court here today .....

D- T- of Upper St. James and mother of four children said that for three months all she fed her 15-month old baby was mint tea. The child died on February 20 last of malnutrition .....

A post-mortem revealed that six year old Anthony S- of a Montego Bay address died of broncho pneumonia and malnutrition on February 4 last. The mother said to the Coroner that Anthony had been sickly from birth and that all she fed him over the years was tea and porridge.....

Shirley Ann S -, 10 months old, died from dehydration and malnutrition also earlier this year.

(Editor:Cajanus. Coroner juries in the West Indies enquire into uncertified deaths, i.e. deaths of persons not seen by a physician during the last 14 days of life. This extract from a newspaper report is reproduced here to illustrate that, in spite of much progress in the last two decades, there are still cases, not very rare, where parental ignorance of children's nutritional needs can be sufficient to cause or contribute largely to death).

OAS GIVES TRINIDAD 10,000 POUNDS FOR FOOD TECHNOLOGY PROJECT
From the "Daily Gleaner", June 6, 1969

The Organization of American States (OAS) today presented Trinidad and Tobago with a cheque for (US) $25,000 (about 10,416 Pounds) to help finance a project to develop food technology.

A communique issued at the end of the second day of the OAS Inter-American Cultural Council meeting here said it was the first major OAS contribution to the development of science and technology in Trinidad and Tobago.

A request for assistance in the respect had been made by The National Scientific Advisory Council of Trinidad and Tobago last April.

The food technology project includes food preservation and the processing of tropical fruits.

Dr. Kenneth Julien, chairman of the Council, received the cheque on behalf of the Government from OAS Secretary-General, Dr. Galo Plaza.

Work in the field of food technology will be carried out at the Faculty of Engineering of the University of the West Indies branch here with the participation of students from other OAS member states.

A similar sum of money is to be released for the programme during the next fiscal year of the OAS.

COMING - $14.2 MILLION FISHING COMPLEX
From the "Trinidad Guardian" 17 May 1969

Trinidad and Tobago has finally realised the importance of implementing and developing one of the country's richest and most viable economic assets - fishing. With this realisation, the country is planning"a multi-million dollar fishing industry complex in its Draft Five-Year Development Plan. The complex is to include the Carifta territories."

A story in "Commercial Fisheries Review" claims that the $14.2m. fisheries scheme calls for the purchase, installation and operation of the entire project by a single company.

The "Review" is described as a "comprehensive view of the U.S. and foreign fishing industries - including catch, processing, marketing, research and legislation - prepared by the Bureau of Commercial Fisheries."

The story on Trinidad and Tobago originated in the U.S. Embassy here last December.

It adds that the proposed company would be responsible for

(a) a fleet of seiners and trawlers

(b) support vessels to transfer catch and furnish ice fuel, food and all other requirements from fishing port to fishing grounds.

(c) a special fishing harbour with cold storages and facilities for manufacturing ice and dry ice.

(d) a maintenance shop for engines and fishing gear and a small shipyard for the fishing fleet.

(e) a small factory to make and repair fishing nets.

(f) a store for spare parts and fuel oil bunkers for local and visiting ships.

(g) processing facilities for canning, filleting, smoking and dehydrating fish and for producing fish meal and fish protein concentrate.

(h) distributing centres in Trinidad and Tobago and in other CARIFTA area territories, to market fresh, chilled, and frozen fish, emphasising safe and sanitary distribution.

The story adds that the United Nations Special Fund has set aside $3m to provide technical assistance for implementation of the project, and supervision during the first operational period.

"Plans to build a modern fishing port are included. Sea Lots, Point Lisas and Chaguaramas are possible sites. A fisheries training school is to be established at the University of the West Indies to provide technological training.

Finally, the report adds that "it is not clear whether

the Government will run the proposed scheme entirely on its own initiative or invite local entrepreneurs to participate.

Nevertheless, it is clear that Trinidad and Tobago has finally realised the importance of implementing and developing one of the country's richest and most viable economic assets."

This plan appears to go a step or two beyond the Government's thinking in the Draft Third Five Year Development Plan. The plan says that the Government hopes to accomplish a 50 to 100 per cent increase in catch by "a continuous and intensive drive to improve the gear and fishing method to replace uneconomic and unserviceable boats.

"Because of the technical, economic and social aspects of this fishery, Government will endeavour to reserve it for the local small fishermen operating from beaches all around the island.

The "Review" story most nearly meets the plan's proposals of para 262 which state that "the Government intends to establish jointly with private enterprise, or to encourage the establishment of, a locally based, locally owned fleet of shrimp trawlers to exploit the international fishing grounds off the north-eastern coast of South America."

The Plan adds that the capital requirements of the shrimp fleet would be about $15m and that fish caught as a by-product of shrimping "may be exported in some frozen form."

The "Review" also corresponds with the plan's proposal for a single fishing harbour. "Government," the plan says, "intends to provide the central harbour to meet the needs of local fishing and for servicing foreign fleets operating in the area."

CONSUMERS' BODY GETS CONSTITUTION
From the "Barbados Advocate" 17 May 1969

The draft constitution of the Barbados Consumers' Association was on Thursday adopted at the second general meeting of the newly formed body.

The association is an independent, autonomous, non profit-making, non-sectarian and non-political organisation.

Its aims are to increase the awareness of consumers; to identify and promote the proper interests of consumers and the means of their protection; and to provide a channel for consumer opinion and representation in the area of the association.

During Thursday's meeting members discussed ways and means of how best to tackle proprietors who sell various

commodities at exorbitant prices.

The association agreed that consumers in Barbados need to be educated in the economic and sensible use of locally grown foods.

It is also hoped that the association will seek membership of the International Organisation of Consumer unions and Caribbean Consumer Committee.

FARMERS' INCOMES NOT ADEQUATE - PRIME MINISTER
From the "Trinidad Guardian" 9 May 1969.

Prime Minister Dr. Eric Williams yesterday described as "a major concern" the securing of adequate annual incomes for farmers, near those obtained in industrial and urban occupations. That, he said, must be foremost in the minds of citizens.

Officially launching the 1969 Jayland Fair, sponsored by the Junior Chamber of South Trinidad, Dr. Williams added: "We must be most conscious of the imbalance between incomes earned in agriculture and in the rest of the economy - an imbalance which is just as significant and which has more profound consequences for our economic and social development than the imbalance between earnings of different parts of the industrial

and urban sectors of our economy."

In both the short and the long run, the real answer to this rural-urban imbalance, Dr. Williams said, was to increase the productivity per acre of Agriculture by the application of better methods and techniques.

In his opening speech, Dr. Williams said the country needed to expand production of agricultural products for domestic consumption to the greatest extent possible. The national market, he noted, was small, and, therefore, the country must simultaneously seek to exploit potential foreign markets.

He mentioned the country's self-sufficiency in poultry products, and noted the expressions of satisfaction about pork production.

But the production costs were still far too high, he said, the major reason being the high cost of stockfeed. Efforts, however, were being expended in producing cheaper feeding stocks with locally produced bases.

"We must remember that our operations must take the framework of Carifta into account. Over the first year of Carifta's existence, it must be admitted that little has been achieved in

the field of agriculture. However, it is certain that advance in this field will be made within Carifta in the near future," the the Prime Minister said.

He added: "I can honestly state that, in spite of the tremendous technical, sociological and organisational difficulties which beset Agriculture in all developing countries, including Trinidad and Tobago, our agriculture has over the last three years begun to move forward and that its pace of advance will be accelerated as a result of the impact of Agriculture Year on the consciousness of the average farmer and citizen."

GUYANA SPOTLIGHTS RICE
From "War on Hunger" April 1969.

The Government of Guyana plans to modernize all phases of its rice industry - storage, receiving, handling, cleaning, drying and grading - during the next two years with the help of a $12.9 million loan from the Agency for International Development. The Guyanese will add $4.6 million of their own funds.

Studies show that Guyana's current rice yields can be doubled by using improved seed and cultivation techniques, but

all of the gains made in food production could be wiped out unless dramatic improvements are made in post-harvest conditions. The comprehensive plan aims to both increase rice yield and decrease grain losses.

The program includes the construction of six modern, modular-designed rice storage and drying centers, each having a grain handling capacity of 1,000 bushels per hour. Each center also will be provided three storage silos for milled rice along with modern handling, weighing, grading, and bagging equipment. When complete, total milled rice storage capacity per site is estimated to be 10,000 metric tons. As this tonnage increases, more modules can be added.

Fifty mobile units will transport dried paddy to the mills and, in turn, take milled rice to the storage centers. A single unit will comprise a paddy-rice bulk trailer and two bins with grain handling conveyors.

Road and milling improvements, a modern 618-acre Rice Research Center, and technical managerial assistance are some of the subprojects included in the program.

Under terms of the AID loan, the Government of Guyana will relend the funds to the reorganized Rice Development Corporation which will in turn contract for the necessary facilities. March 1, 1971, is the scheduled completion date for the entire project.

FOOD HABITS AND THEIR MODIFICATION FOR CARIES CONTROL*

by
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Food and food habits can affect dental health both positively and negatively. To date, our major research efforts have been expended in studying the effects of the biochemistry of nutrients on dental caries. We need, now, to give equal emphasis to the social, environmental and humanistic factors in dental caries etiology and control. To this end, we have been providing individualized nutritional guidance to patients with high caries susceptibility which essentially consists of modifying, in a realistic and acceptable fashion, food choices and practices.

Modifying Food Habits

Food habits are the ways people have learned to select and consume food as a result of social pressures and cultural tradition. In general, they are formed early in life and are influenced by all the forces which mold an individual's personality and his behavior.

In order to effect change, or better, to modify food habits, we need first to answer the following questions:

** Courtesy of 'Nutrition News', National Dairy Council, Chicago, U.S.A. We reproduce this article from the February 1969 issue of 'Nutrition News', because we feel that this is a very good discussion of how food habits can be modified, and this topic has wide relevance to the treatment of obesity and the management of diabetes mellitus as well as to caries prevention.*

1) What inadequacies exist in the patient's present food selection?

The inadequacy of the diet can be determined by comparing the actual amounts of the foods eaten with the amounts recommended according to the U.S. Department of Agriculture (1958) Daily Food Guide, and other similar guides, of the "Four Food Groups"- milk, meat, fruit-vegetables and bread-cereals. The adult should select 2, 2, 4 and 4 servings respectively for an adequate day's diet. For the adolescent, because of his greater nutrient requirements, we have suggested three to four servings of milk, two of meat, five to six of vegetables-fruits and five to six of bread-cereal.

2) What are the reasons for food selection?

We like to call this the "Why" of the diet. By inquiring about the patient's typical daily routine from the time he arises in the morning until he retires at night, we can learn much about the social, emotional, environmental and systemic factors that influence his food choices and eating habits. For example, many histories reveal the use of sweets as an appeasement or a bribe to overcome an unpleasant situation. Other patients are compulsive sweet eaters. These we call "carboholics."

3) How can we effectively motivate the patient to accept and

cooperate with change?

a. We must explain the nature and the consequences of the problem.

b. We must provide the opportunity for the patient to find his own solution; in short, encourage self-help by having him actively participate in analyzing the adequacy of his diet.

c. If we can arrange conditions so that it is extremely likely and easy for a person to engage in the desired behavior, the chances of cooperation in accepting change are infinitely greater. We do this by encouraging the patient to choose his own diet based on the facts of what he now knows is right or wrong for him. We reinforce his choice by approval and commendation. We also find it helpful to appeal to the adolescent's esthetic senses - specifically, improved complexion, becoming stronger and performing better in school. We might even suggest to him ways of keeping so busy that he doesn't have time to snack.

A Specific Office Procedure for Caries Control

For practical purposes, our office procedure is divided into four different steps:

We make a clinical judgment of a patient's caries susceptibility by comparing DMF (number of decayed, missing or filled teeth) with age. If DMF equals, or is greater than,age, the patient has high caries susceptibility. Step I of nutritional guidance is to to have the patient keep a food diary for five days. To obtain

sufficient detail, we demonstrate by example the recording of his previous 24 hours intake.

Step 2 is ascertaining the "Why" of the diet. During the next few visits, we try to develop some insight about our patient. We try to understand his likes and dislikes; whether he cares or doesn't care; whether he is rigid or flexible and what factors influence his daily routine and his life situation. This information is helpful in prescribing a personalized diet which the patient can accept and implement.

The actual counseling visit is Step 3. First, the carious process is expiained according to the following scheme:

Food	+	Germs	Acid
Acid	+	Tooth	Cavity

The patient himself will volunteer the information that of the three controllable factors, food, germs and tooth, food is the easiest one to do something about. We then ask him to circle in red all the foods in his diary that are sweetened with sugar. He will be astonished and disbelieving at the vivid illustration of the number of sweet items he has been eating each day. Then he is asked to tally the uncircled foods and dishes into one of the "Four Food Groups" and from this assess the adequacy of his diet.

We next ask the patient to count up the number of times

during the day his teeth have been exposed to sweets. If, for example, he has 6 exposures, we would multiply this by 20, the average number of minutes it takes to neutralize the acid formed in the plaque. The patient is very graphically and dramatically impressed when he is told that his teeth were possibly undergoing some decalcification for 2 hours (6 x 20 min. = 120 min.).

Finally the patient writes out a diet prescription for himself, suggesting which foods and food practices he will alter. By the "soft sell" nondirective approach, the patient himself will select foods and dishes he likes and which are also acceptable from the caries-preventive standpoint.

We suggest improvements only in the nutritional quality of foods selected, not in the quantity. For example, if regular cola is his favorite drink, we might suggest substituting diet cola, chocolate milk or fruit juice. Rather than only advising the elimination of sugar-sweetened snacks, we suggest suitable substitutes and alternatives such as raw fruits, cheese, nuts and artificially sweetened gum.

Step 4 is a check on how food habit modification works in practice. A few weeks after the counseling service a second food diary is completed, evaluated and compared with the first.

Conclusions

It has been suggested that nutritional supervision can prevent caries incidence by 50 percent. A step-by-step procedure as outlined here should provide about this amount of protection for dental patients. Through personalized diet planning, not only will the dentist accomplish his prime goal, more adequate caries control and inhibition, but he will also be afforded the opportunity to deal with the social and humanistic aspects of the disease, in addition to the biochemical etiology.

YOUR QUESTIONS ANSWERED

Q. *Is it true that peas and beans, especially if mouldy, can cause liver cancer in humans?*

A. As far as we are aware, no case of liver cancer in a human being has ever been shown, or reasonably suspected, to have been caused by eating mouldy *peas and beans*.

What is known is that the mould or fungus *Aspergillus flavus* when contaminating *groundnuts* has caused fatal liver damage in turkeys and other poultry and liver cancer in rats. For a human being to consume the same dose as these animals relative to body size would require of course prolonged regular consumption of contaminated groundnuts.

There are also other mycotoxins (as these poisons from fungi growing on foods are called) which have been found in legumes and cereals and which cause various diseases in cattle and other farm animals when they are present in the feeds. Ergotism or 'St. Anthony's Fire' is a well-known example of a mycotoxin in rye bread, which is used in continental Europe.

Nevertheless, in spite of the slim chance of disease in humans due to contaminated groundnuts, and even slimmer chance of disease due to mouldy peas and beans, in the present state of knowledge governments are quite right to be strict in their inspection of both legumes and cereals for signs of fungal contamination. Mouldy batches of foods should be rejected out of hand at the point of importation or when offered for sale to a food

processor or packer or an agricultural marketing corporation. Agricultural extension workers should put emphasis on proper methods of harvesting, drying and storing legumes and grains. The consumer should avoid mouldy peas, beans and groundnuts in the same way that he avoids blown cans of food or milk that has not been pasteurised or sterilised, or uninspected meat.

However, it would be most unfortunate if there was a panic reaction on the part of the public which could cause a fall in the consumption of legumes, for this would mean the loss of a valuable protein food item from the diet of people in the Caribbean, just as it would be detrimental to health if milk consumption fell because unpasteurised milk may cause brucellosis. Persons making public pronouncements and newspaper and radio reporters would be wise to be rather cautious in this matter, so as not to stimulate an unnecessary and harmful public prejudice against legumes as such, while at the same time emphasising the need to avoid mouldy peas and beans etc. just as we avoid all contaminated foods.

Q. How is food iron utilized and what type of diet should one recommend for anemic patients? (Dr. V.M. Usborne, St. Vincent)

A. The causes of anaemia are numerous, and each case should be investigated individually. The most prevalent type is iron

deficiency anaemia, in which an imbalance between iron intake and iron loss has occurred, it is especially common among pregnant women and young children.

Iron absorption depends on many factors such as the efficiency of the upper gastro-intestinal tract in reducing and absorbing available iron, the amount of iron present in the diet, the type of iron, the content in the diet of either phytates (which form insoluble or non absorbable iron phytate in the intestine) or phosphates (which may bind iron and prevent absorption) and the severity of iron depletion in the human subject. The usual range of food iron absorption is between 2 and 10% in healthy subjects and in iron deficient persons it may increase to between 15 and 20%. Food iron occurs in different forms and is not as readily absorbable as iron salts. In recent years the total iron content of certain foods has been improved by the addition of iron salts during processing, i.e. bread, certain strained infant foods and some commercially prepared milk powders. When radio-actively tagged foods are used, it is shown that iron fromv veal was absorbed as effectively as ferrous sulphate, but iron from fish, soybean and haemaglobin only half as well.

Recent studies have shown that the absorption of iron varies with the mixtures of foods taken. For example, fruit

juice will enhance the absorption of iron salts added to bread but not that of iron in wheat bran. It has also been found that the presence of protein especially of sulphur containing amino-acids will enhance the absorption of dietary iron.

Individuals suffering from iron deficiency anaemia should receive iron salts by mouth such as an inexpensive preparation of ferrous sulphate tablets as they cannot be cured by diet alone.

In most countries, cereals are the largest single source of protein, calories and iron, they are also rich in phosphates and phytates, known to inhibit iron absorption. In advising a suitable iron-rich mixed dietary to anaemic patients one should choose foods which are culturally acceptable, available and inexpensive sources of iron.

The following relatively inexpensive animal protein foods are good sources of iron, and are expressed in terms of mg iron per 100g edible portion (FAO Food composition table): Salted dry beef, (9.7 mg), Heart (5.4 mg), liver (5.1 mg), kidney (5.7 mg), lung (6.6 mg), sardines in oil (3.5 mg), salted and smoked mackerel (3.6 mg), salted dry cod (3.6 mg). Eggs, goat meat, chicken, mutton, ham and lamb have lower values in iron. Legumes, such as the well accepted peas and beans, are good sources

of iron with a range from 2.0 to 6.0 mg but they contain considerable amounts of phytic acids though no evidence is available on the relationship between iron deficiency and legume intakes. Dark green leafy vegetables provide substantial amounts of iron (range from 2.0 mg to 6.0 mg) and their cultivation in home gardens and use should be encouraged. Ground provisions (Irish potatoes, dasheen etc.) fresh fruits and vegetables, including the breadfruit, mature coconut and peanuts contain lesser amounts of iron. The use of our local cocoa (11.6 mg) as a drink sweetened with brown sugar (3.6 mg) is an excellent addition of dietary iron, as is the CSM powder (corn, soya, dried skim milk) (5.2 mg per 100 g) sometimes distributed in clinics and schools for child feeding.

A fallacious belief, however, widely held in the West Indies, is that the green plantain contains a great deal of iron; this is probably because of its rapid deterioration in colour when removed from its skin but the darkening process is due to the presence of phenolic acids and not iron compounds. It is in fact an indifferent source of iron (0.9 mg).

It is however ironical that in this "moon age" when food technology has reached such excellence that the available iron in our dietary is becoming minimized because of necessary rigid standards of purity and cleanliness which preclude extrinsic

iron-rich sources such as soil particles (e.g. laterite) being introduced into our foods, and the advent of the aluminium or more extensive teflon cooking utensils has replaced the iron cooking vessels of yesteryear.

Q. Since vitamin C is destroyed by heat, what contribution do dark green leafy vegetables make in areas where fruits are scarce?

A. In places where fruits are not easily available, the next best source of vitamin C is usually that of dark green leafy vegetables. These are often cooked prior to consumption and a certain amount of the vitamin is undoubtedly destroyed through the process. Despite this however, what remains is enough for these vegetables to constitute a relatively useful source of the vitamin. Losses through cooking can of course be minimised by cutting down as much as possible on time and temperature of cooking.

Furthermore, as vitamin C is also destroyed by oxidation, the vitamin can be further conserved by reducing the extent of oxidation by cooking in covered pans.

Q. What fruit juices may be used as sources of vitamin C for young children?

A. While breast-fed babies obtain sufficient ascorbic acid from their mother's milk, infants artificially bottle-fed on cow's

milk preparations need additional vitamin C in the form of fruit juice or ascorbic acid tablets, from the age of one month onwards (See Cajanus No. 2, April 1968). We are plentifully blessed in the West Indies with a variety of fruits which are rich sources of vitamin C. The following fruit juices contain per 100 c.c. (3-1/2 oz.) these amounts of the vitamin -

Orange juice (50 mg.), grapefruit (43 mg.), lemon (40 mg.), guavas (75 mg.), mango (53 mg.), papaya (50 mg.). Tomato juice, however, only contains 27 mg. per 100 c.c.

The recommended dietary allowances (Food & Nutrition Board, National Academy of Sciences - National Research Council - Revised 1968) for a one-month old baby is 35 mg. of vitamin C a day. The following dosage of fruit juice will amply fulfill this need -

Orange juice 2-1/2 oz. (70 c.c.), Grapefruit 3-oz. (81 c.c.), Guava 1-3/4 oz. (46 c.c.), Mango 2-1/2 oz. (86 c.c.) Papaya 2-1/2 oz. (70 c.c.), Lemon 3 oz (88 c.c.) Tomato 4-1/2 oz. (130 c.c.)

But it must be remembered that unsanitary preparation of these fruit juices will tend to precipitate attacks of diarrhoea in the young infant, and if such conditions exist, the use of ascorbic acid tablets which require less handling is advisable.

Tinned fruit juices may also be used, as the vitamin content is not destroyed by the processing and a surplus of additional ascrobic acid is generally added prior to canning. The wise consumer will

verify the amount of vitamin C contained in each tin. The disadvantage of using canned juices is that they are relatively expensive and do not keep well without refrigeration.

THERE ARE NO HARMLESS SUBSTANCES

by

Linda Grace

(Reprinted from 'World Health', The Magazine of WHO, April 1969)

Food additives, says the man in the street, are a bad thing; but it all depends on what you mean, for every time a cod is salted or a cucumber pickled, the salt or vinegar, in a sense, is a food additive. But there is also the official definition of a food additive adopted by FAO and WHO: "a non-nutritive substance added intentionally to food; generally in small quantities, to improve its appearance, flavour, texture or storage properties."

Appearance of food might be thought to be least important, but not so by commercial food processors. Over the past century, consumers have become increasingly discerning. Dill pickles or canned peas may be just as tasty when their colour is greyish green, but the consumer prefers bright green colours which necessitate additives. The introduction of supermarkets and self-service shops in many countries and the development of modern transparent plastic containers have made the appearance of food more important in influencing the buyer's choice. Yet appearance can deceive, even dangerously. English toffees and boiled sweets are still famous, but they no longer have the bright colours that were the hallmark of "London sweets" at the end of the 19th century: most of the bright colours used then contained lead pigments.

The increasing use of flavouring agents in food processing had led to much discussion and extensive legislation. The problem often concerns the distinction between natural and artificial flavours. Chemists have identified the chemical compounds responsible for the flavour of many natural foods. γ-undecalactone, which is the major constituent of peach and apricot flavour, had been synthesized in the laboratory for some years before it was discovered that it also existed in natural fruits. Food chemists will explain that it is cheaper and more effective to use synthetic and pure undecalactone than to use fresh peaches, which may have been sprayed with certain pesticides or tainted with rot. As for the vitamins naturally present in peaches, the same chemists may explain that their natural concentrations are negligible in commercial ice-cream or pastry and may therefore be replaced by appropriate amounts of synthetic vitamins.

The use of food additives to improve texture is another development of the processing industry in deference to consumer demand. Emulsifiers are the commonest additives in use. They ensure that mayonnaise and margarines retain their smoothness for months, and impart to commercial whipped-cream toppings their velvety texture and capacity to retain shape. Other additives prevent the caking of granulated food, the separation of emulsions or their formation.

Wastage and shortage

In some cases, little distinguishes the additives used to improve texture from those which enhance the keeping qualities. Better storage conditions are essential if more food is to be provided for the millions of people in the world who are undernourished. A group of experts meeting under the auspices of WHO estimated that about 20% of the world's food is lost through waste and spoilage.

Food preservation is often a race against time: fresh meat, fish or poultry will keep at most one or two days at room temperature: after that, deterioration is rapid. Dried, salted or canned meat and fish may be kept for a year or more. Fresh ripe fruit will spoil in a day or, at best, after a week; dried fruits will keep for over a year. Even untreated root crops are at their best for only one to three weeks: after that, they will soften and sprout.

All manner of things may be added to food for preservation. We know from long experience and experimentation that some are innocuous. It all depends on the dose ingested; even ordinary salt may be harmful in excess. But the more foods are treated, the greater the chance of two or more preservatives being used. They may be metabolized at different rates and may, possibly, have

a synergistic action. Most processes of food preservation aim mainly at the control of the microbial spoilage. Heat or irradiation can destroy micro-organisms; cold or dehydration will retard the growth of many. High concentrations of sugar, salt or vinegar will also inhibit their growth as will certain preservatives added to meat, fish and poultry. However, there is the possibility of enlisting the aid of useful micro-organisms which ferment cheese, sauerkraut, beer or wine. Sometimes several methods are in use. Ham, for instance, is usually salted, often partially cooked or smoked, and then treated with small amounts of nitrite.

One of the major principles guiding the use of food additives is to employ the minimum quantity needed to produce the desired effect. Research is being carried out to discover preservatives that will be self-eliminating: they should kill harmful bacteria and then disappear without leaving any residues.

There is no justification for using additives of doubtful safety. In most cases alternatives are available. The selected additive may not fulfill all the technological requirements, but there should be no health hazards arising from its use. This principle is widely applied today. Agene was used for many years as a bleaching and improving agent for flour. When it was shown to cause convulsions in experimental animals, its use was

abandoned by the millers. Other bleaching agents are available and there was no need, therefore, to continue with one shown to possess certain toxic properties.

Food adulteration and contamination

In the past, the use of food additives was synonymous with food adulteration. The forerunners of public analysts in Britain were the beer tasters who spilled a little beer or ale on a wooden bench and then sat on it until it dried. If their leather breeches stuck to the bench, it was considered proof that the beer had been adulterated by the addition of sugar.

When industrial food processing began on a large scale in the last century, unscrupulous chemists had a field day. Not only lead, but mercury, arsenic and copper salts were common colouring materials; formaldehyde and hydrogen peroxide were used as preservatives and considered for a long time by some to be preferable to pasteurization of milk.

Falsification and adulteration are comparatively rare today. Manufacturers of strawberry jam may use high-grade strawberries and sugar, or they may use pectin and strawberry aldehyde and pumpkin chunks - and call it artificial strawberry jam. Neither of these extremes causes difficulties, which may, however, arise when a manufacturer uses low-grade strawberries, a little

pectin, colouring matter, and a small amount of artificial flavouring. He is unlikely to label the result artificial strawberry jam. The need for adequate labelling is, therefore, one of the major concerns of consumers' associations, and such associations are usually encouraged by government authorities responsible for food safety.

But for this protection to be effective, consumers must have more than a rudimentary knowledge of the meaning of such terms as "natural" and "artificial".

Many people have an inherent dislike of anything artificial, especially in food, and yet, as in the case of peach flavour, the synthetic material often is identical in chemical structure with the natural product, but offers possibilities far beyond the scope of the natural product. Some industrial advocates of artificial colourings or flavourings insist that it is safer practice than allowing cooks at home to add uncontrolled substances, bought at the corner shop. Neither natural nor synthetic substances are wholly good or bad. Arsenic and lead, though naturally occurring in food, are toxic to man if taken in certain quantities. Yet certain natural foods contain relatively large quantities of these metals. The classic example is shellfish which concentrate higher amounts of arsenic than would be permitted in factory-produced food in almost any country.

Authorities charged with controlling the wholesomeness of our food often find it easier to deal with the intentional additives than with contaminants. The economic necessity for using pesticides is indisputed and chemists are working constantly to discover effective compounds that will leave a minimum or no residue at all in the food consumed. The major difficulties arise not in the laboratory but in the field or orchard. Some farmers may feel that if one spraying is good, two will be better and a triple-concentrated dose three times so. There may also be difficulties to enforce the instructions on the use of pesticides, e.g. that apples, for instance, should not be treated in the month before harvest.

Packaging materials

Not so long ago, pre-packed foods appeared either in glass jars or tin cans. Glass is assumed to be practically inert and to pose no problems. Tin cans have, for over a hundred years, been made of sheets of iron or steel, plated with tin on both sides and soldered at the seams. Today, the inside of most cans is coated with a special lacquer; otherwise, during storage, a slow corrosion might take place.

Fortunately neither tin nor iron salts are harmful within wide limits; iron is even essential to human health. The most

dangerous part of the can is the solder which contains a high proportion of lead. Today only two minute areas of solder are normally in contact with the contents but in the last century the whole seam was exposed. Hundred-year-old tins of roast veal and carrots were opened and analyzed in a test undertaken in 1938. Despite the heavy deposits of solder on all the seams, the tinned food itself contained almost no lead. This was explained by the fact that, in many food products, lead behaves as a cathode in relation to tin, the latter going into solution and displacing the lead ion which is then deposited in insoluble form.

The migration of undesirable substances from packaging materials into the wrapped foods presents many problems for food scientists. Recently, complex packaging materials have come into use. Many are made of plastics and very few of them are completely insoluble. Plastics behave differently with various foodstuffs. Thus, a plastic container that is not attacked by sugar or acid may be a suitable container for jams. But the unsuspecting housewife may decide to re-use the empty jar for collecting drippings, unaware that certain toxic constituents may now be extracted by the fatty contents.

WHO and FAO work closely together on the evaluation of all aspects of food additives. Joint meetings of experts are held

regularly to examine the many facts that must be considered before valid conclusions can be formulated. As food standards are set up they become part of the FAO/WHO Codex Alimentari us a book of food standards that will be accepted eventually, so it is hoped by the sponsors, on a world-wide basis. As an example - over 70 countries have accepted the Codex standards for milk and milk processing.

In efforts to improve nutrition, some categories of food are accorded high priority. They include foods representing a major portion of the diet in one or more countries or in the diet of babies and young children. A baby's digestive system is not just a miniature replica of an adult's - some substances, harmless to an adult, cannot be dealt with by an infant. Furthermore, an adult is likely to eat a mixed diet of different types of food, often including processed foods. On the other hadn, mothers who use commercially prepared baby foods for their infants are likely to feed the babies on the same food or the same brand of foods over prolonged periods. These are some of the special problems to be examined by a group of experts meeting this year.

For WHO, the motto in the field of food additives is prudence. Adequate tests are needed to determine its safety before permitting the use of a new additive. Nor may additives

continue to be used despite satisfactory laboratory tests if they cause unfavourable reactions. Recently, doctors reported many sudden cases of a peculiar dermatitis in Holland. The probable cause was discovered to be a new emulsifier for margarine. Despite the undeniable technological advantages, its use was quickly abandoned: there are alternative satisfactory emulsifiers available.

A recent amendment to the United States Food and Drug Act states succinctly a basic principle it is well to remember: "There are no harmless substances; there are only harmless ways of using them."

CFNI NEWS

In the last two months the Diploma in Community Nutrition Course continued to be the chief activity of the Institute, together with processing the results of the Barbados National Nutrition Survey carried out in May.

The students completed the survey on 1st June and after two days of field visits and lectures in Barbados, moved to Trinidad on 5th June. There they have completed six weeks of further studies concluding with examinations, and have now returned to their home countries in order to carry out under supervision the three-month research projects which will complete their one (academic) year course and the requirements for the diploma. Both examination result and report on research project are taken into account in assessment of performance. The research projects are of a practical 'applied' nature, such as, for example, enquiries into food habits, infant feeding practices, nutrition education programmes, utilization of donated food aid, etc.

The Barbados National Nutrition Survey, as explained in the last issue of 'Cajanus', was carried out jointly by Barbados Government personnel and CFNI students and staff, with the aid also of PAHO/WHO and FAO and the Barbados Child Care Association. The data was successfully processed by use of computers in Jamaica and Trinidad, and the preliminary results were presented to Barbados

Government representatives and the CFNI students at a two day meeting in Trinidad. The material presented covered all sections of survey, medical, socio-economic, agricultural and food consumption, and is extensive. It is still termed 'preliminary' because the material consists of tabulations of data only, and associations and correlations between findings in various parts of the survey will be worked out later this year, together with significance tests and a few tables which remain to be produced. The survey involved the examination of a random sample of just under one per cent of the population, in 650 households. Food consumption studies were carried out in 139 families, and in respect of over 70 individuals in these families in nutritionally vulnerable age-groups. A resume of the findings will be published in an issue of 'Cajanus' early next year, when the complete and detailed results of the survey have been formally presented to the Government of Barbados.

It is hoped to publish the results in full thereafter, in book form, by about mid-1970.

Speaking of publications, CFNI's first venture in this field, "*Protein Foods for the Caribbean*" will shortly be available. It is the proceedings of the conference on that topic held under CFNI/Government of Guyana auspices in Georgetown in July of last year. A notice will appear in the next issue of this newsletter

(Cajanus 11).

We shall soon be welcoming another recruit to the international staff of the Institute. Miss Manuelita Zephirin, from Barbados, will in August take up a PAHO/WHO post at the Institute's Trinidad Centre. Her consultant work for PAHO/WHO in 1967 and 1969 ensures that she is well known to those of our readers in the area who are concerned with hospital dietetics and catering. Her duties will concern institutional food services, including hospitals, but also in other institutions e.g. schools, industry, day care centres. It is hoped that it will eventually perhaps be possible to establish some suitable form of training on a regional basis, after enquiries and consultation with governments and all concerned as to the extent and nature of the need.

THE SOCIAL BACKGROUND OF MALNUTRITION IN JAMAICA

by

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In developing Caribbean countries, where the major tropical diseases largely have been eradicated, those disorders whose origins lie in poverty, lack of knowledge or in local cultural factors are assuming an increasingly important role. Malnutrition in childhood is one such disorder and, although it is almost certainly declining, it is doing so much less dramatically than the infections.

In Jamaica 90 percent of deaths attributed to malnutrition, and more than 75% of those due to gastro-enteritis, occur between the ages of six months and three years. Between these ages the reduction in mortality between 1948 and 1963 has been very much less than that in either younger or older children.(1)

The causes of malnutrition are well known. Children are at high risk in environments where standards of hygiene are low and infections common, where diets are poor in quality and in quantity and where infant care is inadequate due either to economic pressures or irresponsibility. Furthermore, when a child fails to thrive the local customs and beliefs sometimes may dictate that inappropriate

measures are taken.

The interaction between these various factors is complex and the contributions made by each to the widespread problem of infant malnutrition are little understood. It is essentially a community problem and has to be studied in the community.

In this report we describe observations made on a cohort of Jamaican infants born between November 1st, 1962 and October 31st, 1963 and followed up since birth. The study was designed to investigate social factors influencing the growth and development of children in a representative rural district.

Socio-economic background

The population, living in an agricultural area of about twelve square miles surrounding the village of Lawrence Tavern, some fifteen miles inland from the capital, Kingston, was defined by a private census. The area is a fertile but hilly district where the majority of the inhabitants are small subsistence farmers and their families.

Crops form the basis of the agricultural production but the continuing fragmentation of properties has resulted in small plots and a single farmer may cultivate in three or four separated areas. This, together with the extreme steepness of

the terrain means that farming is inefficient.

Furthermore, much of the land farmed is rented on insecure tenancies and there is little incentive to improve it; despite exploitative farming the land is fertile and each farmer tends to grow a wide variety of crops, usually in small quantities. Banana, plantain, coconut, cocoa, breadfruit, citrus, ackee, mango, pulses and root crops and sugar cane, are grown for local use and for sale in Kingston. Marketing outlets and marketing arrangements are poor.

The population at the census in 1962 was about 7,500. Though mainly of African origin, many people show evidence of European, Indian or Chinese ancestry. They are cheerful and friendly but life in Lawrence Tavern is hard; poverty and under-employment are widespread.

Despite the general poverty, standards of living are improving steadily. Few people are destitute and the population looks healthy; men are tough and muscular, women well built and rarely underweight; overt signs of malnutrition are rarely seen in children old enough to cope with adult foods. Marasmus and kwashiorkor still exist, however, and growth in infancy is well below that in developed countries.

The warm Jamaican climate with only slight seasonal changes

compensates for poor housing. People spend most of their daylight hours working or playing out of doors, but at night the members of a family often share one bed in an overcrowded, one-room shack.

(There follows in this article meant for general world-wide readership, a description of family structure in the West Indies, but, this is well-known to most of our readers)

The study design

Two Hundred and fifty-nine children were known to have been born to women living within the area during the 'intake' year: 4 were stillborn, 3 neonatal deaths occurred; 23 were not included in the study either because their mothers refused (5) or because they were not traced sufficiently soon after birth (18). The remaining 229 children, (90 per cent of the survivors) formed the study group.

Child welfare clinics were specially established for these children at which advice and treatment were given when necessary, free or subsidised milk was provided for those entitled to it and immunisations were carried out. Anthropometric measurements were made at frequent intervals and details were obtained from the mothers and by home visiting to provide information on social background of the child, the family structure, the diet given and the occurrence of illnesses. The clinics were run, under the supervision of one public health nurse, by nurses and voluntary

helpers.

Comparisons are being made between this group of children and a second group from the same area who have been observed with minimal medical intervention, but will not be discussed in this paper.

RESULTS

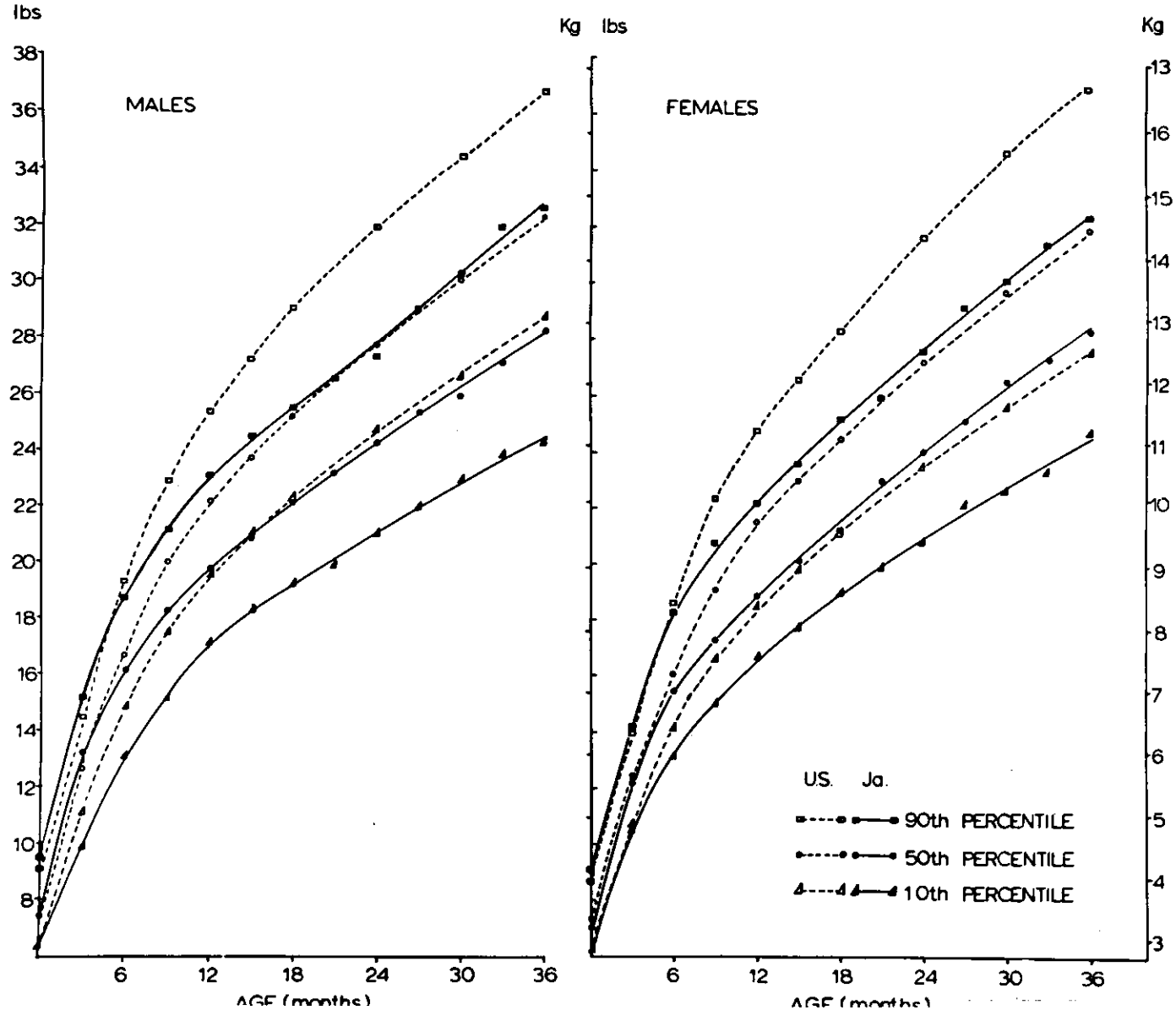
Five of the 229 children in the study, four boys and one girl, died before the age of 2-1/2 years; one death was due to malnutrition (in spite of the special clinic facilities provided). Eleven children required hospitalisation during this period; in two cases this was for gastro-enteritis and in two for kwashiorkor. In view of the nature of the study these figures probably underestimate the incidence of severe malnutrition in rural Jamaican infants.

Figure 1 shows median weights, and 90th and 10th percentiles of weight for male and female children from birth to 3 years compared with similar data quoted by Nelson (1959) from the Harvard study in Boston, U.S.A. carried out by Stuart and Stevenson.(2) Median birth weights compare well with the Boston figures and weight gain in the first three months is similar. From three months of age the Jamaican weights start falling behind the American values and continue to do so up to the third year.

MEDIAN WEIGHTS & 10th & 90th PERCENTILES IN THE FIRST THREE YEARS

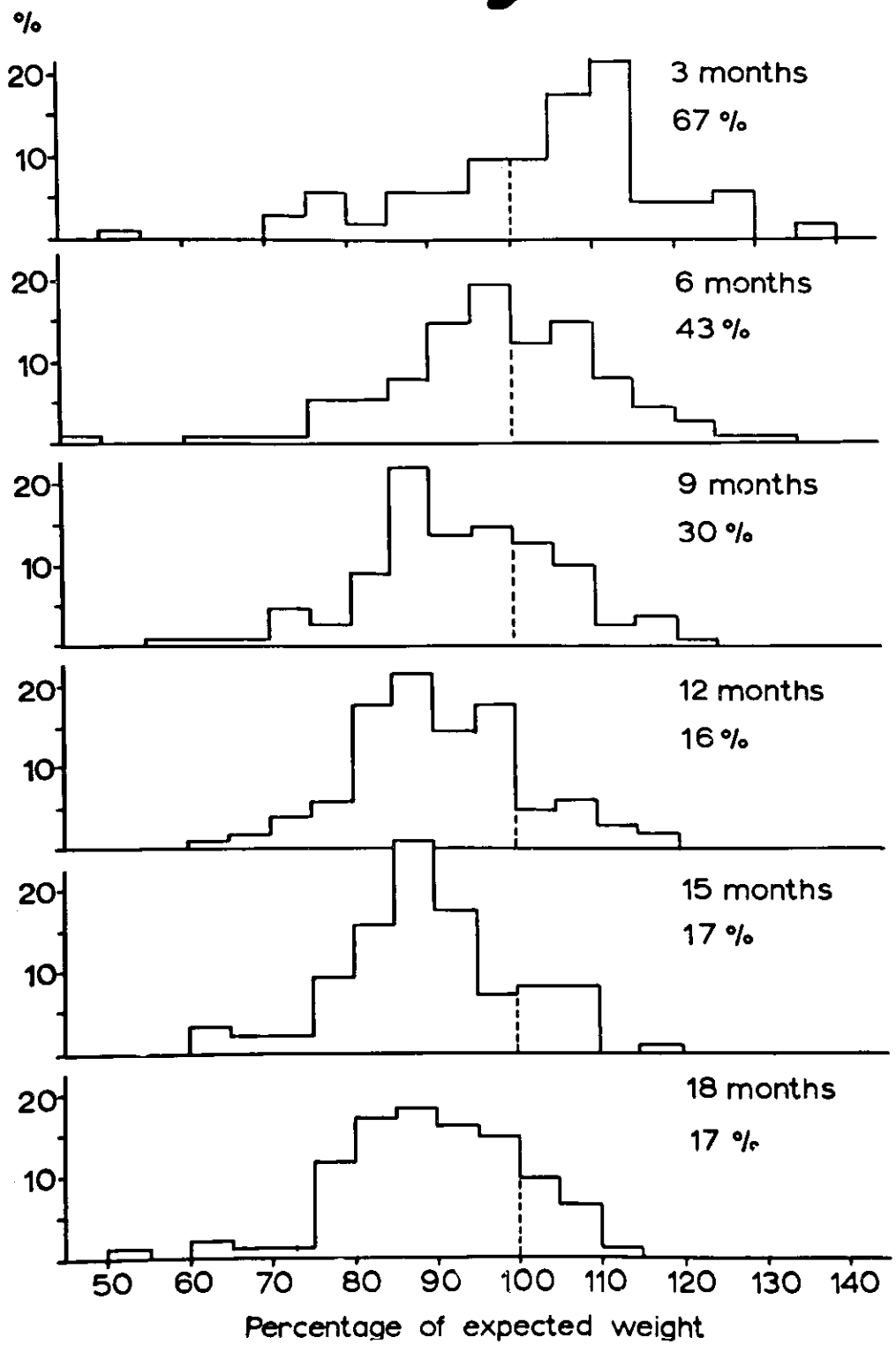
LAWRENCE TAVERN, JAMAICA & BOSTON, U.S.

Fig. 1.



FREQUENCY DISTRIBUTIONS OF EXPECTED WEIGHT FOR AGE AT DIFFERENT AGES LAWRENCE TAVERN, MALES

Fig. 2



FREQUENCY DISTRIBUTIONS OF EXPECTED WEIGHT FOR HEIGHT AT DIFFERENT AGES

LAWRENCE TAVERN, MALES

Fig. 3.

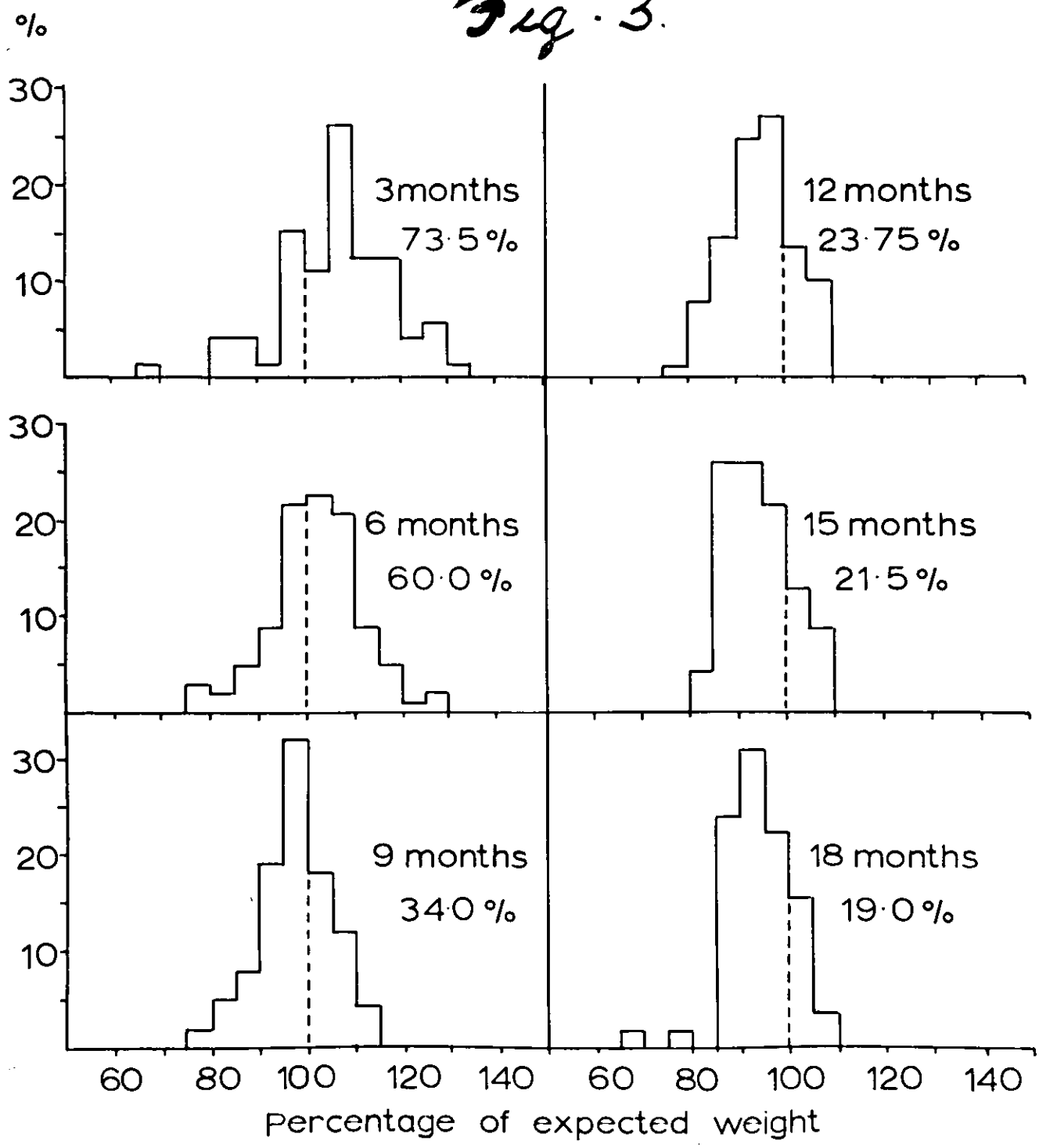


Figure 2 illustrates the frequency distributions of expected weight for age at each quarter to eighteen months, for males, and **Figure 3** shows similar distribution of expected weight for height, in both cases using the Boston values as norms.

By eighteen months of age only 17 per cent of Lawrence Tavern boys are their expected weight for age, and only 19 per cent have attained their expected weight for height by these standards. At three years of age, 14 per cent of boys had reached their expected weight for age, 15 per cent had reached their expected height for age. But they were not only small in weight and stature; they were also thin, only 22 per cent having attained their expected weight for height by these 1939 American standards. The data for females were similar.

These findings show that Jamaican infants grow relatively slowly between three months and three years of age. *Table* 1 shows means and standard deviations of quarterly increments, together with their 10th and 90th percentile values. Increments were found to have little relationship with either the birth weight, or with the weight at three months of age, and therefore have been used as indices of the child's progress.

In this analysis we have investigated the social background of infants whose quarterly increments were on or above the 90th percentile, and on or below the 10th percentile; three representative quarters during the first 2 years of age have

been selected to illustrate the findings - one during lactation (3-6 months), one soon after weaning (9-12 months) and one at a period when the child is starting adult foods but unable to feed himself (15 - 18 months).

During the quarter from 3 to 6 months, infants whose weight increments were above the 90th percentile differed, in their family backgrounds, from those with increments below the 10th percentile (*Table 2*). They were the children of somewhat older women; a greater proportion of their mothers were married; the average interval between their births and those of their preceding siblings (if any) was greater.

The two groups differed also in economic factors. Socio-economic status was assessed from housing, possessions, land and stock owned, and the occupations of earners. Extreme poverty was less commonly present in the families of children with good weight gains (14 per cent) than in those with poor weight gains (41 per cent); overcrowding was less severe.

Social integration, judged from the extent to which other women in the study ranked them as persons with whom they wanted to talk, or from whom they would seek advice, was graded. The mothers of children in the two groups showed little difference either in the proportion graded as well integrated socially with

their neighbours or in education.

In the period from 9 to 12 months the social backgrounds of the infants growing well differed from those of children growing badly in a similar way to those at 3 - 6 months. Their mothers were slightly older, a greater proportion were married, they had larger families, and fewer had started a subsequent pregnancy, but little difference was found between the two groups in the spacing between these and previous children. Socio-economic factors and social integration appeared to play an important role at this age but maternal education was similar in the two groups.

By 15 - 18 months, children with good and poor weight increments showed less difference in most of these social variables though, once again, a larger proportion of the mothers in the former group were married and fewer had become pregnant again. Economic factors were similar in the two groups. No consistent difference was found between the groups in the proportions living in extended or nuclear families, nor in the extent to which superstition was thought to motivate decisions regarding the child's welfare.

Among the 227 families - two pairs of twins gave a total of 229 study children - there were several in which parental relationships were particularly unsatisfactory. Five mothers were

either unable or unwilling to name the fathers of their infants. Four mothers and four fathers were married to men and women other than those with whom they had the child in the study. Five men had each fathered, by different women, two children in the study. Two fathers and two mothers had abandoned their families. One father took his infant from its mother against her wishes.

The twenty-five study children in these unstable families included an excess whose weight increments were below the 10th percentile - 20 per cent in the 3-6 month quarter, 30 per cent in the 9 - 12 month quarter, and 20 per cent in the 15 - 18 month period. They included few with weight increments above the 90th percentile. (8 per cent, 4 per cent and 8 per cent respectively) and in general their mothers took much less advantage of the available clinic facilities.

Apart from these twenty-five children there were another 77 whose parents were single and living apart, and in this group there were 50 fathers who contributed rarely, if ever, towards the upkeep of their children. Thus, in this area at this time, 102 families (44.5 per cent) were, by any standards, based on unsatisfactory parental relationships; of these 52 were families in which the father was absent and not contributing.

Heavy manuring and fertilisation

Japonica rice gives a high response to fertilizers. When a number of crops are grown in a short period, the addition of plant nutrients is essential. The application of sufficient amounts of manure and fertilizer is therefore of equal importance. Fortunately the farmers are accustomed to applying heavy doses of both chemical fertilizers (120-45-30kg/ha) and manures (10-15 tons/ha) for each crop of rice.

Small farms with sufficient labour

Multiple cropping requires intensive labour the whole year round. In Taiwan the average size of farm is about 1.06ha, with 6.8 persons in each farm family. With such large families living on such small farms labour wages are naturally low and labour is intensively employed in crop cultivation. This has, however, resulted in some of the most efficient use of land in the world.

As the summer and winter crops are mostly food crops, their market prices are quite stable in the densely populated area of Taiwan. Evidently there is no serious marketing problem. The tenancy system is also favourable to the cultivation of summer and winter crops. Both crops are considered as additional income to the tenants which the landlord cannot share. In fact, the majority of the growers are owner-farmers, anyway, and they constitute 67%

type (native rice). Among the *japonica* type varieties adopted in central Taiwan mature 5 - 10 days earlier than that in other regions. As a result the crop season on average is about four months for the first crop and three months for the second crop, as compared with 4-4.5 and 3.5 months respectively in other regions. This leaves a longer time for growing summer and winter cash crops. Dwarf and stiff straw and non-shattered grains are the particular characters of *japonica* types of rice. These characters are especially preferred for the field operation in interplanting the succeeding crop. The *indica* type of rice, with tall and soft stems and easily shattered grains, would make interplanting of succeeding crops at about 10 - 20 days before the harvest of the current crop almost impossible.

Line transplanting

Line transplanting of rice seedlings is practised strictly in fields growing *japonica*-type rice. This practice facilitates not only the field operations of the current crop, but also the interplanting of the succeeding crop. It is easy to adjust the row distance of the succeeding crop when that of the first crop is at a uniform space. For instance, the row distance of rice is usually 8 in. (20 cm.) apart. A row distance of 2 ft. is aimed for in the succeeding crop, in which case it is interplanted between every three rice rows.

soybean, green manure crop (Sesbania sp) or native cabbage.

C. Native cabbage

D. Wheat, maize, broccoli, cauliflower, chinese cabbage or field pea.

Factors favourable to Multiple Cropping

Natural conditions in Taiwan are favourable to the adoption of multiple cropping. There are also many human factors contributing to their full development.

Fine weather and ample irrigation

In the major part of Taiwan the winter days are mild and sunny. Both are necessary for plant growth. Dry weather is also convenient for field operations, including harvesting. Adequate soil moisture is maintained with regular irrigation. As the water sources are plentiful in central Taiwan, irrigation is unlimited for all kinds of winter crops. In northern Taiwan only 3 in. (76mm) of water is given to the winter crop. In the south the weather is extremely dry during the winter and water resources are scanty and winter crops generally receive no irrigation. In practising multiple cropping, water should be completely under the control of the grower. A combination of fine and dry weather with sufficient irrigation assures a bumper winter crop for the grower.

Proper rice varieties

The *japonica* type of rice varieties are widely grown in Taiwan. They are generally about 15-20 days earlier than the *indica*

MULTIPLE CROPPING IN TAIWAN

by
Dr. Peter Kung,
FAO Agricultural Officer, Bangkok

Favourable natural conditions and good irrigation facilities in Taiwan, China, make it possible to grow a number of crops in a year. The rate of land utilisation is very high. Double cropping of rice is prevalent over all the island. The first rice crop takes about 4 - 4.5 months (from transplanting to harvest) and the second rice crop 3.5 months, leaving 3 - 4 months for a transitional period which is long enough to grow a short-season crop forming a triple-cropping system. Generally, winter green manure crops are grown after the harvest of the second crop of rice. They are usually sown broadcast 15-20 days before the harvest of the second rice crop and ploughed under 3 - 4 weeks before the transplanting of first rice crop in the next year. Winter cash crops are also grown on a commercial scale throughout the island, making three harvests in one year. In certain areas quadruple or quintuple-cropping systems are practised.

Generally, the multiple-cropping system practised commercially in the paddy fields in Taiwan can be grouped into the following patterns:

1. Double cropping: Rice + Rice
2. Triple cropping: Rice + Rice + Winter Crop A
3. Quadruple cropping:
   (I) Rice + Summer Crop B + Rice + Winter Crop A
   (Ii) Rice + Rice + Winter Crop C + Winter Crop A
4. Quintuple cropping: Rice + Summer Crop B + Rice + Winter Crop C + Winter Crop D

Explanation:

A. Wheat, barley, buckwheat, maize, soybean, sweet potato, rape seeds, field pea, tobacco, flax. green manure crop (green bean), broccoli, cauliflower, chinese cabbage or tomato.
B. Oriental pickling melon, Japanese cantaloup, jute, sweet potato,

Nutrient	Per Capita Daily Intake					
	Before Center	Mothercraft Center only	Mothercraft Center plus Agriculture Program			Percent Improvement
	1964	1965	1966	1968 Severe Drought	1969	1964 - 1969
Niacin, mg.	7.0	11.6	10.8	8.3	12.2	74
Riboflavin, mg.	0.4	0.7	0.6	0.5	2.9	375
Ascorbic Acid, mg.	33	38	48	41	66	100
Daily food/ fuel cost	7.8	8.0	8.0	8.6	8.7	12

Of particular significance are the major increases in nutrient intake concurrent with only a small increase in expenditures. In addition, it would appear that, although the center alone accomplished solid progress, the addition of the agricultural program facilitated even greater improvement.

Yours etc.,

Kendall W. King

From Dr. Kendall O. King, Research Corporation, New York

Dear Sir,

Earlier this year (February issue, page 25) you published an article entitled "A Community Nutrition Programme in Haiti". I feel your readers may be interested in the latest data on the evaluation of this project, the results of a dietary survey last summer in Fond Parisien, where a Mothercraft Center operated from 1964 to 1969, and was coupled to an irrigation-oriented agricultural program from 1966 to 1969. The data are summarised in the Table.

RECENT DEVELOPMENTS - NUTRIENT INTAKE -FOND PARISIEN

Nutrient	Per Capita Daily Intake					Percent Improvement
	Before Center	Mothercraft Center only	Mothercraft Center plus Agriculture Program			
	1964	1965	1966	1968 severe drought	1969	1964 - 1969
Calories	1269	1608	1633	1350	1818	43
Protein, total, g.	30	43	47	39	49	63
Protein, animal, g.	3.4	6.1	6.8	7.2	8.6	153
Calcium, mg	148	239	221	212	318	115
Iron, mg.	11	16	16	13	17	54
Vitamin A, IU.	1111	1254	724	1766	1727	55
Thiamine mg.	0.9	1.3	1.4	1.1	5.6	522

READERS' LETTERS

From Daphne Brown-Mitchell, District Health Visitor, Princes Town, Trinidad

Dear Sir,

I have recently resumed duties after my annual leave, and found a copy of "Cajanus" among my mails.

Very rarely do we receive such kind consideration, and this is one reason I have taken time off to thank those who were responsible for posting the copy to me.

On reading "Cajanus" I have found it to be very informative. I have tried out the Pigeon Peas and Spinach Soup recipe; it was quite a good dish and gave that Dasheen Cakes recipe to the mothers so that they too may benefit.

Hopefully I look forward to the day when more local foodstuffs would be taken to the laboratories, so that the correct food values would be obtained and correct method of preparation would be employed which would assist us in raising our nutritional standard and the health of our nation.

May I also take this opportunity to say that I would be grateful to receive more and similar publications whenever they are issued; they really assist in keeping one up to date.

Thank you in anticipation.

Yours etc.,

Daphne Brown-Mitchell
D.H.V.

a) greater consumption of cereals in areas where starchy roots or fruits are the main staples;

b) partial replacement of maize by other cereals and of highly milled rice by under-milled or parboiled rice or by other cereals which have not been over-milled; and

c) increased consumption of protein-rich foods, especially of pulses when a starchy root or fruit is the main staple food (5) and of animal products, as well as other protective foods, as appropriate.

References

(1) "Rice and Rice Diets - A Nutritional Survey" - FAO Nutritional Studies No. 1, Second edition, 1954, page 19.

(2) "Protein Requirements" - FAO Nutrition Meetings Report Series No. 37, 1965, page 48.

(3) "Rice Enrichment in the Philippines" - FAO Nutritional Studies No. 12, 1954.

(4) "Maize and Maize Diets - A Nutritional Survey" - FAO Nutritional Studies No. 9, 1953, page 47.

(5) "Legumes in Human Nutrition" - FAO Nutritional Studies No.19, 1964, page 91.

of course, be necessarily advantageous unless the new food is superior in nutritive value and is in a form, which retains most of its original value. For example, partial replacement of parboiled or under-milled rice by highly refined or low-extraction wheat flour cannot be considered as nutritionally desirable in all cases.

An important factor to be recognized in relation to the substitution of one staple by another is the relative digestibility of various foods. In the short run, the digestibility of a food is likely to be less for the new consumer as compared with the habitual consumer of the same food. In the long run, however, it is not possible to assert that one food is definitely more digestible than another for all consumers pending further knowledge on this subject.

Many of the nutrients lost in milling and other forms of processing can be replaced by "enrichment" with added nutrients but one can never be completely sure that all of the lost nutrients have been fully restored. A well-known example is enriched rice which has been in use in some countries (3). Another example is maize (corn) which is mainly deficient in niacin(4).

While the calorie needs of the increasing populations in the developing areas must be met on a priority basis, it is desirable from the nutritional point of view to encourage:

four times more protein per 1000 calories than cassava. Therefore, it is desirable that starchy roots should be used rather as supplementary foods and not as main staple foods. Gradual replacement of starchy roots, etc., by cereals can be considered, in general, to be nutritionally advantageous.

Thus, cereals are all very similar to each other but superior to starchy roots and fruits with respect to calories. With regard to protein and other nutrients, however, different cereals vary considerably, depending also upon the processes to which they are subjected before consumption. As stated earlier, parboiled and undermilled rice are superior in this respect to highly milled white rice and, similarly, flours of high extraction are superior to those of the corresponding flours of low extraction. The specific impact of these differences in each case, of course, can only be judged in relation to the rest of the diet, i.e. to what extent pulses, animal products, fruits and vegetables contribute protein and other nutrients.

Other things being equal, mixed cereal diets are to be preferred generally to those based on a single cereal. For instance, the partial replacement of milled white rice in a rice-eater's diet with another cereal product, such as wheat flour of high extraction, which has not undergone any serious loss of the nutrients as a result of processing the whole grain, can be considered to be a nutritional improvement. However, the substitution of one cereal by another will not

extraction wheat flour, the latter is still relatively more nutritious.

The so-called "coarse grains", including sorghums and millets, should not be considered as a class to be inferior to the other cereals in nutritive value, in spite of that descriptive term. Indeed, some of them are particularly rich in certain nutrients, e.g. Quinoa (Chenopodium quinoa) and Ragi (Eleusine coracana) are much richer in calcium than wheat or rice.

Starchy roots and fruits give a high yield in terms of calories per hectare, e.g. 5600 for cassava and 4500 for sweet potato as against 3300 for rice (1). On the other hand, the protein yield in kilograms per hectare of cassava is only 18 as against 28 for rice and the protein content of starchy roots is very low even on a dry weight basis. Moreover, the protein quality of starchy roots is markedly lower than that of cereals, e.g. the Chemical Score of protein is 40 for cassava as against 75 for rice (2). However, some starchy roots and fruits, especially yellow varieties of sweet potatoes, contain fair amounts of vitamins A and C. They contain also some amounts of B Group vitamins but generally much less than cereals.

Kwashiorkor and other protein/calorie deficiencies are more prevalent among populations which subsist mainly on starchy roots or fruits rather than on cereals which are richer in protein and B Group vitamins on an equivalent calorie basis, e.g. milled rice contains

rich in these vitamins, are known to suffer seriously from deficiency diseases, especially "beri-beri", which is caused by a deficiency of vitamin B_1 (thiamine). "Parboiled" rice, which is soaked in water and steamed before milling, loses much less of the nutrients during milling and washing but its characteristic colour, flavour and taste are not always liked by those who are not used to it. Losses of nutrients in rice could also be reduced by under-milling, improving the cleanliness of rice as sold so that excessive washing with water becomes unnecessary and also by discouraging the method of cooking in excess of water and discarding the water subsequently. Faulty treatment of other cereals before consumption may also cause serious losses of nutritive value. For instance, excessive milling in the preparation of highly refined wheat flour or heating to unduly high temperatures in the manufacture of breakfast cereals can reduce the nutritive value of wheat. Ordinarily, there are no serious losses of nutrients involved in the process of baking bread. Products made from low extraction wheat flour, such as macaroni and spaghetti, are comparatively inferior in their content of vitamins and minerals to other wheat products made from wholemeal or high extraction flour, such as "chapatis" in India and Pakistan. Although there is not much difference in this respect between milled white rice and refined or low

NUTRITIVE VALUE OF CEREALS AND OTHER MAIN STAPLE FOODS*

by

K. K. P.N. Rao
Chief, Food Consumption & Planning Branch
Nutrition Division
FAO,
Rome.

On the whole, cereals are of higher nutritive value than roots or tubers per unit of weight. Cereals are generally characterised by a high calorie content, substantial protein content as well as fair amounts of the vitamins of the B Group and minerals, especially in the whole or under-milled state, but little of vitamins A and C. Like any other food, no cereal can be considered as a complete food, either singly or in combination with other cereals. Moreover, the nutritive value of a food should be judged on the basis of its content with respect to calories as well as all essential nutrients - proteins, minerals and vitamins - but not on the basis of any one of these in isolation.

There are more marked differences in the nutritive values of cereals in the forms in which they are usually prepared or processed for consumption. For instance, milling, washing and cooking cause more serious losses of vitamins and minerals in rice than in most other cereals. Highly milled rice loses much of its vitamins and minerals, e.g. 80 per cent of thiamine and 90 per cent of calcium, while subsequent washing and cooking in excessive water lead to further serious losses of the water-soluble vitamins.(1) Thus, people who subsist largely on milled white rice and consume little else of other foods

*By kind permission from FAO Nutrition Newsletter, Vol. 7, No. 2 pp.16-18.

persons both sick and well, an ability to get along under good circumstances and bad is indispensable.

The potential dietitian should find food a fascinating interest. Curiosity about food, enthusiasm for its preparation and appearance, excitement about the roles of proteins, minerals, vitamins, fatty acids and trace elements in human nutrition - these are essential.

The direction of food service activities is the main responsibility of the dietitian - As soon as it is clearly understood that she is a director - a teacher and not a preparer of foods and half qualified nurse her position in the hospital will be a more effective one.

The challenges offered in the field of dietetics are unlimited for the dietitian who is willing to give of her time and self to meet the demands being placed on her as a member of her profession and community.

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* Footnote: In the next issue of 'Cajanus' we will reprint the second article in this series "The Role of the Nutritionist".

opportunities for employment in many different types of organizations. Dietitians direct food service in schools and universities and in commercial and industrial organisations. Others are associated with health and welfare agencies or research laboratories. Some teach or write.

Dietetics offers advantages not easily found in other professions. It is a career in which the human element is still paramount. Dietetics deals directly with people and at a level of intense personal involvement - their need for food.

It offers a wide range of different career opportunities, for the expression of individual interests.

Although most dietitians are women an increasing number of men are entering the field. Men serve as directors of food service in hospitals and colleges and in commercial organizations.

What are the personal qualifications for a career in dietetics?

The first is eagerness to serve people. If you want to work toward a better world, promote good health and prevent disease, dietetics promises an emotionally fulfilling career.

Important Trait

Another important trait is a liking for people. Because the food expert is part of a professional team and intimately concerned with

Other courses are in the field of foods and nutrition and management.

Hospital dietitians work mainly in two areas - administrative and therapeutic - the administrative dietitian is a food service executive who plans, organises, supervises and controls.

She directs her department's budget, supervises the purchase and preparation of food, develops the menu,plans and supervises in-service education programmes for all dietary staff.

Her responsibilities include the overall planning and delegation of work to be done within her department.

Her interest should be not only in efficient operation of her own department to achieve the mission of patient care but also to fit her departmental efforts in with those of the total hospital programme.

The therapeutic dietitian participates actively in those areas which contribute to dietary management of the patient. She takes and interprets diet histories and interprets the doctor's dietary prescription. Dietary instruction is given to the patient and where necessary his family. The therapeutic dietitian participates in medical conferences and rounds to correlate dietary management with total medical care.

About half of all dietitians serve in hospitals but there are

professional and administrative staff.

Dietitians have contributed to the well being of patients by providing proper diets to public relations by serving appetising meals and to the successful administration of the hospital by carefully controlling operating costs.

The term dietitian suggests cookery and food service but fails to imply a special knowledge of the science of nutrition or expertness in applying the principles of this science to the treatment of disease.

Because of the lack of understanding of a dietitian's training, it is possible that very little effort would be made to utilise the dietitian's educational background to the best advantage.

What should be known about the hospital dietitian to deal with her more effectively?

She is a person with a bachelor's degree with a major in food, nutrition, institution management or restaurant management.

Her field is a specialised one built upon natural sciences such as chemistry, microbiology, physiology and upon social sciences such as psychology, economics, sociology and human relations.

patterned along North American lines, to enrich its brands, the company's secretary, Mr. Joe Shephard, has disclosed.

Mr. Shephard said most of the credit should go to the Government who imposed regulations under the food and drugs ordinance making the use of additives necessary.

On July 10, the Government announced that additives must be included. It stipulated that thiamine, riboflavin, iron and calcium be placed in the processing of flour.

THE ROLE OF THE DIETITIAN*
From 'Barbados Advocate' September 22, 1969

Barbadians and West Indians alike have been confused over the difference between a dietitian and a nutritionist.

They both deal with food and are trained, in part, along similar lines. But, there is a difference.

Many people think of a dietitian chiefly as a cook or a menu planner. This is incorrect for a dietitian today does not cook except for her own pleasure and menu planning is only one facet of her activities.

Since the first hospital dietitian was employed in North America several years ago dietitians have become an integral part of the hospital

or bottle) from birth to the time of the study; time of cessation of breast feeding and weaning, and any changes in type of milk used; and these were correlated with the number of diarrhoeal episodes and the age of occurrence.

It was evident that the breast-fed infants were less affected by diarrhoeal attacks and their nutritional status was better, exactly the opposite of those fed artificially from birth. It was the greater severity and frequency of attacks in the artificially fed which affected their nutritional status rather than the type of milk itself. There was a significant relationship between the time of weaning and the onset of the first episode of diarrhoea in more than 50 per cent of the infants.

The percentage of infants who ceased breast-feeding early, and of infants who never had the breast at all was high. A more extensive survey is recommended to define more exactly the importance of this problem and to find a solution. It is very important indeed to try to increase the practice of breast-feeding both by means of massive education campaigns and of the daily work of all who in one way or another are related to health.

TRINIDAD USING ADDITIVES TO ENRICH FLOUR
From 'Barbados Advocate' 30 August 1969

Trinidad Flour Mills Limited has begun using additives,

Taiwan's fish farming techniques also made an impression on the Minister. He said there were two species, the milk fish and the carp, which could probably be introduced into Jamaica.

As regards agricultural production itself, Mr. McLaren mentioned Taiwan's mushroom crop. Beginning almost from scratch, Taiwan had become, in five years the world's largest producer of mushrooms. In this context he said Jamaica could produce vegetables on a bigger scale than it was now doing, but it would have to find markets for export.

TYPES OF LACTATION AND WEANING AS DETERMINING FACTORS
IN ACUTE DIARRHOEA AND MALNUTRITION UNDER SIX MONTHS AGE
From 'Revista Cubana de Pediatria (Cuban Review of Pediatrics) vol. 40, May - June 1968, p. 299 (by Mirta Hermela and colleagues)

Eight hundred infants less than six months old were studied. They came from suburban Havana, and were from a population which is fairly homogeneous as far as hygiene and economic conditions are concerned. 400 had been discharged from hospital after an admission for diarrhoea, and were being followed-up at out-patients; the other 400 were normal infants who were attending the child welfare sessions at the polyclinics of the corresponding areas. In both groups the following factors were analysed:- nutritional status; type of feeding (breast,

Asked how he proposed to apply in Jamaica the knowledge he had gained in soil conservation, Mr. McLaren said he was convinced that if bench-terracing was expanded on a large scale on Jamaican hillsides, 50 per cent of these lands could be brought into full production. He would take steps to widen the programme already in existence in pilot areas, he added.

Mr. McLaren also observed that, in its agriculture, Taiwan made great use of small farm machinery which was made in the country and most of which were designed to work on terraces. The Minister said he intended to import a few of these in order to see how well they would work under Jamaican soil conditions.

He was also impressed by the farmers' associations in Taiwan and how these were run. He said they performed most of the necessary functions which farmers needed, including provision of farm supplies, marketing and credit. He would examine whether the Jamaican land authorities could be made to perform similar functions for local farmers.

The Minister was impressed too by the programme in forestry in Taiwan. He described this as "highly successful", adding that it had been done with the assistance of the World Food Programme.

As regards irrigation, Mr. McLaren said that Taiwan used "every drop" of its water for irrigation and other purposes. This had led him to conclude that Jamaica could use its water resources much more profitably for agricultural purposes than it was now doing. "Even the present irrigation system that we have can be improved," he added.

Another area of agricultural activity in Taiwan from which the Minister felt Jamaica could benefit a great deal was in soil conservation. Two-thirds of the land space in Taiwan was hillside, and nearly all of this had been terraced. This result was that although the country was three times the size of Jamaica, with a population of 14 million, it had become self-sufficient so far as agriculture was concerned. Average land-holding per farmer was 2-1/2 acres.

Mr. McLaren also noted that, together with its improvement of agricultural techniques, Taiwan had instituted a land reform programme ten years ago. This had been done to correct a situation by which 37 per cent of the land was owned by landlords and tenanted out to farmers who had to pay rental amounting to 70 per cent of the gross returns.

The Taiwan Government's action had resulted in gradual compulsory acquisition of the land to settle farmers, and a reduction from 70 per cent to 37.5 per cent of the gross profit payment to the landlords.

NUTRITION NEWS AND OPINION FROM THE CARIBBEAN

FARM EXPERTS FROM TAIWAN: McLAREN OPENS TALKS
From 'The Daily Gleaner', Kingston, 27 October 1969

The Minister of Rural Land Development, the Hon. William McLaren, has opened discussion with the Taiwan Government with a view to getting a team of agricultural experts from Taiwan to come to Jamaica to look into some of the island's agricultural problems and to make recommendations for solving those problems.

At the same time, the Minister has also held preliminary talks with the Taiwan Government on the possibility of employing a number of agricultural technicians to help Jamaica work out some of its farming problems.

This was stated by Mr. McLaren, on his return yesterday from an official two-week visit to Taiwan.

Mr. McLaren said he was very impressed with what he had seen. "The whole trip has confirmed a lot of ideas we have had before; it has confirmed that those ideas can be implemented," he declared.

Describing farming techniques in Taiwan as "fantastic", Mr. McLaren said: "I have never seen agriculture like that before. Every inch of arable land is fully utilised."

Mr. McLaren observed developments in soil conservation, land reform, water conservation, irrigation, farmers' organizations, co-operatives and forestry.

potential in physical development, but intellectual development as well. It is true that in underdeveloped countries, undernutrition is the principal cause of premature deaths; but in the survivors the damage is still worse, producing limitations that make it difficult for them to be wholly incorporated into the socioeconomic development of the country.

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CAJANOQUOTE: *"Another thing....likely to breed a certain amount of disrespect for advertising among its practitioners is the triviality that constitutes most of big advertising...The big money in advertising is not in important items and commodities, but in products that are economic pipsqueaks: Deodorants, cosmetics, beverages, soaps, toothpaste, hair preparations, patent medicines, tobacco, breakfast foods, and so on... Well, there is nothing wrong with advertising these undifferentiated products except that (if you're the type that thinks about such matters) it may dawn on you that if they didn't advertise at all it wouldn't make very much difference to anybody - or to the economy."* - Howard Gossage in 'Advertising Age', quoted in Consumer Reports, Oct. 1969.

Some follow-up studies point out the existence of a critical period during the early stages of life, in which malnutrition would provoke permanent damage (*M.B. Stoch and P.M. Smythe, Malnutrition, Learning, and Behaviour, p. 278; Monckeberg, Ibid., p. 269*). This results in a restricted intellectual development.

Fortunately, in a great majority of underdeveloped countries, undernutrition starts after the first semester of life - that is, after the period of rapid brain growth. This is due to preservation of prolonged maternal lactation. Nevertheless, it seems evident during recent years that malnutrition is starting at earlier ages. As the urbanization and communication means of the population improve, an immediate decrease in breast feeding is observed. In underdeveloped countries this phenomenon has fatal consequences, because the sanitary, economic and cultural conditions do not improve in a parallel way, resulting in a shift of malnutrition from the pre-school to the infant stage. From this standpoint it seems advisable to prevent these changes and make all the necessary efforts to preserve maternal lactation in those underdeveloped areas.

In summary, there seems to be strong evidence that malnutrition "per se" affects not only the expression of genetic

performance, but at the same time mental deficit aggravates malnutrition. This vicious circle explains why malnutrition persists from one generation to another with very few possibilities for the individual to improve his condition.

From a practical point of view, it is necessary to clarify whether the effects of malnutrition are permanent or transitory, as well as whether there exists a critical period during which damage is more severe. Some observations on animals, as well as in humans, indicate that the effects of malnutrition are more severe and lasting the earlier subalimentation begins and the longer it lasts. It is well known that brain growth takes place primarily during the first months of life and is largely a process of protein synthesis (*J.W. Dickerson and Dobbing, Proc. Roy. Soc. Biol., 166, 396 (1967).* In patients suffering from marasmus during the first months of life, a smaller head circumference can be demonstrated, which clearly indicates a lesser brain growth (*Mönckeberg et al., Rev. Chilena Pediat. 38, 522 (1967).* In severe cases it has been demonstrated that not only is the head smaller, but there is also a disproportion between brain and skull size. Using a skull transillumination technique, an increase in spinal fluid is observed, which can be interpreted as secondary to brain atrophy. These changes obviously must play an important role in determining subsequent mental capacity.

ceased to be significant when cranial growth was within normal limits. This very important fact leads us to think that the nutritional factor influences intelligence quotient, because it is difficult to assume that retardation of cranial growth is the consequence of environmental factors other than nutrition.

All these observations, although they do not permit us to obtain definite conclusions about the role of subalimentation in producing a proportional retardation of psychomotor development, at least strongly suggest this possibility. Attention is called to the high incidence of psychomotor retardation in the economically depressed population, not only in preschool children but in adults as well. In the slum area studied only 6 per cent of the mothers had an I.Q. over 90 and 77 per cent had an I.Q. less than 75. It is quite probable that the scales used to determine intelligence quotient might not be entirely adequate for those groups (Wechsler-Bellevue test), but it cannot be denied that this low I.Q. is a conditioning factor of malnutrition, since a very close relationship was found between the mothers' I.Q. and nutritional status of their children ($p < 0.001$). The lower the mother's I.Q., the worse the nutritional status of the child. That is to say, that beside any defect in the employed method it certainly evidences the adults' incapacity to give the appropriate nutrition to their children. This fact is extremely important, because it means that malnutrition not only produces low intellectual

Hemisphere Nutrition Congress, 1968). A similar correlation can be seen between animal protein intake and intelligence quotient, so that those children consuming a smaller proportion of animal protein present a significantly lower intelligence quotient. This correlation is not observed when analyzing the total amount of calorie intake. In spite of these suggestive correlations, we cannot assert that nutrition is the only factor correlating with intelligence quotient, because even in these slum areas with a more or less homogeneously low level population, it is to be assumed that children found to be nutritionally normal live in better educational and socioeconomic conditions. On the other hand, even children with acceptable nutritive conditions present lower I.Q. values than preschool children belonging to groups of a better socioeconomic level. This would confirm that nutritional factors alone are not the only cause conditioning the high incidence of mental capacity deficit in the low socioeconomic groups.

In this same low socioeconomic group of preschool children, another very interesting relationship was observed, suggesting that subalimentation acts upon retardation of psychomotor development; it was found that children with very poor nutritional conditions show a less than normal head circumference for their age. A significant correlation between deficit of cranial growth and intelligence quotient was seen ($P < 0.001$). This correlation

not malnourished, and Groups B and C were lower class children. Groups B and C had the same average income per family, a similar low socioeconomic and educational level of the parents, but different nutritional states. Group B showed little or no malnutrition since these children had for approximately ten years participated in a supplementation program. The program consists basically of free distribution of milk and well-organized free medical assistance. On the contrary, group C had a high incidence of malnutrition. Regarding the incidence of low intellectual development, a marked difference is observed between these three groups: groups A and B had only a 3 per cent subnormality (I.Q. under 80), while group C, with a high incidence of malnutrition, had a rate of 40 per cent subnormality. Nevertheless it still cannot be concluded that malnutrition "per se" is the only cause; the supplemental feeding program and medical assistance acted not only upon the nutritional state, but also upon the environment and maternal motivation. This experiment helps to demonstrate that there is a great difficulty in studying the separate effect of malnutrition upon mental capacity, even in follow-up studies.

When studying groups of low socioeconomic conditions and low intellectual performance (slum areas), a significant relationship can be observed between growth retardation and low intellectual capacity ($p < 0.001$) (*Mönckeberg, Proceedings of the Western*

Different authors have remarked the fact that in low socio-economic groups, pre-school children show a reduced growth and slower maturation rate. At the same time, a higher frequency of retardation of mental and motor development is also observed (F. Mönckeberg, *Malnutrition, Learning, and Behaviour*, p.269). With the present experimental data, it may be safely assumed that retardation of growth and maturation is the consequence of sub-alimentation. Nevertheless we cannot be so certain with regard to mental and motor retardation. There are many environmental factors that may negatively influence intellectual capacity. Unfortunately, the social groups that suffer from malnutrition are precisely those which are outside of the main flow of society, with very low educational, cultural and sanitary levels. All these factors contribute to the presence of a so-called "underworld" that restricts adequate stimulation for mental development. Therefore, it is obvious that the high frequency of mental retardation in this segment of the population is not only a consequence of malnutrition. Malnutrition is never an isolated problem and it is almost impossible to analyze separately the importance of each factor and thus obtain a definite answer.

In an attempt to analyze the effects of malnutrition upon mental capacity during preschool age, 500 preschool children from the city of Santiago (Chile) who belonged to three different social levels were studied. Group A included middle class children who were

MALNUTRITION AND MENTAL BEHAVIOUR*

A review by Dr. Fernando Monckeberg, University of Chile

Animals submitted to severe malnutrition show, among other changes, compromise of the central nervous system: water content is affected, as well as lipid composition and protein synthesis (R.J. Steward and B.S. Platt, in Malnutrition, Learning, and Behaviour, N.S. Scrimshaw and J.E. Gordon, Editors, p.168. M.I.T. Press, Cambridge, 1967; J. Dobbing, Ibid., p. 181; K. Ogata, H. Kido, S. Abe, and M. Satake, Ibid.; p. 131). Although there are few data on biochemical changes in the brain during severe malnutrition of the human being, alterations in learning ability, memory and behaviour are obvious (J. Cravioto, E.R. DeLicardie and H.G. Birch, Pediatrics, 38, 319 (1966).

In recent years, a marked interest has arisen as to whether a chronic subalimentation, not reaching severe degrees, modifies behaviour and mental capacity of the human being. This problem is of extraordinary importance because at present almost 70 per cent of the world's population suffers from chronic subalimentation of varying degrees. If this modification is indeed present, it would be a very strong argument to assert that subalimentation constitutes one of the major obstacles in the progress of underdeveloped countries, since a modern society necessarily needs for its development very highly qualified individuals at all levels.

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oriented to the circumstances of the majority of the population in the Caribbean. It had been hoped this would be largely achieved by establishing a department of home economics at the University of the West Indies, and setting up a degree course in home economics. This move was viewed as one which, among other things, would raise the status or image of the subject, make higher training in the subject available in the area, and ensure the provision of guidance and support to appropriate programmes of education and action in the region.

An essential prerequisite to such an undertaking is factual information on the type and extent of home economics activities in each territory and also some idea of the likely potential of trainees from each island. This information has been lacking until now. The Food and Agriculture Organization of the United Nations is currently in the process of collecting this data, whereupon it will be possible to decide on the size of the department, disciplines to be represented and funds required.

Meanwhile, there has been a noteworthy move in upgrading training in this field through the Associateship courses in Agriculture and household science at the Jamaica School of Agriculture. The course in Agricultural Science is designed to be equivalent to one year less than the degree course at the University. It is very likely that the Associateship course in household science could be recognized as an intermediary stage to the degree in home economics.

height for age is healthy. All such children should be investigated carefully for malnutrition or some other illness.

A very useful way in which a teacher can assess the nutritional status of his or her children is to keep records of height and weight for a year or more; for, whatever the overall size, all primary school children should put on about 2 inches (5 cm.) of height each year and should increase his or her weight by 10% each year. Even better than to keep a written record of height and weight is to plot the results on a growth chart (ordinary school graph paper will do very well) for each child. Such visual records are very easy to read.

If any of our readers would like to make such charts to help him or her to keep a check on the healthy growth and development of individual boys and girls under his or her care, please write to the Editor of Cajanus. He will willingly send the instructions for completing such charts using easily obtainable materials (graph paper, a pencil, a ruler) and for their use.

Q. What is the present position with regard to establishing a faculty of home economics at the University of the West Indies.

A. In the past few years there has been increasing recognition of the need for more appropriate home economics education with greater relevance to problems encountered in the West Indies and

YOUR QUESTIONS ANSWERED

Q. *We are told that malnutrition can be diagnosed in schoolchildren by weighing and measuring them. Does this mean that all the smaller children in my class are undernourished? Surely not!*

A. You are quite right. Some people are born to be big and some small. This is a genetic potentiality derived from their parents. If both parents are naturally rather short and stout the chances are that their children will be, and if the parents are tall and thin so will be, in all probability, their children.

This perfectly natural genetic variation of stature and body weight is considerable. For instance, primary school children of the same height or weight may differ in age by up to 4 years and still be perfectly healthy and well-nourished.

In the Caribbean we come from many different branches of the human race but, fortunately, any racial differences in heights and weights are far less than the differences within ethnic groups. I say "fortunately", for consider how even more difficult it would be to design desks and chairs, shirts and skirts suitable for an even greater variation in physique and size than we already have.

In summary, therefore, while "standard" or "normal" weights and heights of children are very useful, they are only averages. It is however very unlikely that any child who weighs less than 80% (four-fifths) of his or her standard weight, or 90% of his or her standard

course, a number of severe, insulin-dependent, difficult-to-control patients who have to guard against sudden changes in degree of physical effort, sharp temperature changes, and conditions of work which expose them to risk of injury. Each case should be judged on its merits and discriminatory practices based purely on the diagnosis are to be regarded as irrational and unjust.

THE FUTURE

Obesity and diabetes are, for the most part, disorders which appear tame and undramatic as compared with heart disease or conditions requiring heroic and skilled surgery. To anyone familiar with their implications, however, and with the manner in which they have tended to increase in incidence in other countries, the extent of their occurrence within a small population such as that of Trinidad and Tobago is frightening.

Continuous public education and greater alertness on the part of health authorities, doctors and ancillary medical workers, as well as a revolution in food habits and activity patterns are urgently needed.

The Trinidad Diabetic Association has performed a valuable service in 1967,and again this year,by organizing a "Diabetes Week" during which public lectures and other activities served to disseminate useful information.

Education, however, needs to be continuous and repetitive, and a great deal remains to be done in this field.

DIABETES AND INDUSTRY

Employment of diabetics has always been a thorny problem, and in many countries there are severe restrictions, based on prejudice and ignorance, on the placement of diabetics in industry and trades and professions.

We have a definite impression after hundreds of interviews with patients that employer prejudice is an additional burden which this country's diabetics have to face.

A WHO expert committee, reporting on Diabetes Mellitus in 1965, considered that "a diabetic should have the same chances as any person of obtaining and performing work for which he is medically and vocationally suitable."

The majority of controlled, well-supervised and cooperative diabetics are capable of performing any type of work. There are, of

tests on every new patient, and to repeat them periodically on his regulars, is making an initial contribution.

After detection he must, of course, take steps firstly to confirm the diagnosis by blood sugar tests, and then to ensure that the patient is provided with (1) a modicum of basic knowledge about the nature of his disease, (2) appropriate dietary instructions, (3) enlightened assessment of his other therapeutic needs particularly in respect of drugs, (4) facilities for regular life-long medical supervision.

Already the health authorities have given considerable attention to a diabetes control programme and a system of clinics is being set up which, it is hoped, will provide a chain of service, medical and dietetic, between general practitioners, district services and specialist clinics in the larger centres.

However, effectiveness of the system can only reach its maximum when the public is fully educated to make the most of it. Many patients still discontinue treatment and default from supervision as soon as they are symptom-free, in the erroneous belief that cure has been achieved; many are hostile to regimes designed to control their weight, and still others cling to folk beliefs and folk methods of treatment such as bush teas, which usually prove valueless and may, in some cases, be harmful.

if each diabetic had no more than two offspring. In a small insular population such as ours it would perhaps be valid to extend this caution to all relatives of known diabetics.

THE ROLE OF THE MEDICAL PROFESSION

This is a suitable point at which to consider the part of the doctor, be he general practitioner or specialist, in controlling the spread of obesity and diabetes, since it is up to him to persuade his diabetic patients, by pointing out the risks to their offspring, to limit the size of their families.

However, his most important function is perhaps early recognition of the problem in the individual patient.

With diabetics, there are two kinds of prevention to be considered. The first, prevention of the disease in the community, has to do with weight control, sensible counselling in respect of family planning, and education in proper food selection. The second has to do with prevention of complications of the disease, as these are the factors which account for the misery, incapacity, and shortening of life associated with diabetes.

Here early detection and establishment of a life discipline and therapeutic regimen which will control the disease are of the greatest importance, and the practitioner whose policy it is to perform urine

industry will develop increasing varieties of so-called "convenience foods" most of which, based on local foods such as root crops and breadfruit, will constitute a form of refined carbohydrate.

Such foods do not, except in large quantities, satisfy appetite, and should they be established as the preferred substances for between-meals snacking, the long-term effects on health could be disastrous.

Apart from education of the formal type, therefore, there must be repeated use of mass media for publicising the dangers of over-weight and the desirability of putting curbs on the appetite from early middle-age onwards.

The food-industry should concern itself with research into ways of increasing food shelf-life without over-refining, and the use of fresh fruit, green vegetables, and leguminous foods should be encouraged at the expense of high-carbohydrate staples.

The family-planning programme which is now getting into its stride may contribute to diabetes prevention in two ways: firstly by reducing parity and thus avoiding the appearance of the disease in a proportion of middle-aged female potential victims, and secondly, by enabling diabetics voluntarily to limit family size.

Dr. Joslin considered that the incidence of clinical diabetes in the population of the United States could be prevented from rising

a major step in diabetes control.

However, this is far from easy. Changes not only in eating habits but in ways of living are required. The requirements of an industrial society (or one which is trying to industrialise) work against the achievement of such changes.

Perhaps sensible health and nutrition education at school will produce a generation more selective and less prone to gorge on starches and fats and there may be less unnecessary, purely "social" eating such as occurs at all gatherings for whatever purpose, in cinemas, at sporting events, and simply while travelling home by taxi.

Perhaps, too, moderate physical exercise will be continued into middle life to a greater extent than at present, and running, jogging, and keep-fit programmes will become an essential part of the national life as they seem to have done in some other countries such as Japan.

The hot climate is an enemy of exercise and an encouragement to consume sweetened drinks and beer, though, of course, this does not constitute an insuperable difficulty.

Perhaps a greater threat is the likelihood that the food

circumstances leading to the emergence of diabetes as a public health problem.

Another highly relevant conclusion of Cleave and Campbell is that East Indians are racially more susceptible to diabetes than all other races. This is supported by the results of the Trinidad survey in which 2.37% of Indians as compared with 1.44% of Negroes and 2.16% of people of mixed race were found to have diabetes. East Indians form approximately 38% of the population of this country.

In most countries where the disease is common it has been found that the more pregnancies a woman has, the higher the risk of her developing it, and Trinidadian women are no exception to this rule, 44.2% of diabetic women having had six or more pregnancies as compared with 25.2% of the general female population of 15+ years.

Finally, the small size of the country, with intermarriage taking place among a small and relatively fixed population, provides for a greater possibility of inherited tendencies being passed on by both parents.

PREVENTION

From the foregoing evidence it is apparent that a reduction in the incidence and extent of obesity would not merely reduce disability and early deaths from degenerative disorders, but would also be

CAUSES OF DIABETES MELLITUS

The exact method of inheritance of diabetes mellitus is still the subject of controversy among medical geneticists, but there is at least general agreement that the disease is familial and that environmental factors, some of which may be nutritional, may determine its appearance in individuals with an inherited susceptibility.

Drs. Cleave and Campbell who have conducted, in South Africa, one of the largest non-white diabetic clinics in the world and who have collected data relating to the world epidemiology of diabetes have drawn, from their work, a number of interesting conclusions.

Firstly, they considered that a high intake of refined carbohydrate is a crucial factor, and since in most countries this means sugar, they calculated that in any given population an annual per capita intake of over 30 kg. (66 lbs.) sugar will lead to diabetes being common.

According to the ICNND survey the average per capita annual consumption of sugar in Trinidad and Tobago is 16.8 kg., which would appear to be well below danger level. However, Cleave and Campbell considered that all refined carbohydrates, among which white flour and white, polished rice, next to sugar, are most to be feared, contribute to the problem.

The importance of these foods in the local dietary is well-known and it is likely that they, along with sugar, form part of the

sedentary occupations are known, in this and other countries, to increase the risk to both sexes, particularly in middle-life when physical activity is tailing off while appetite remains the same.

The fact that protein-calorie malnutrition, especially in infancy and childhood, remains prevalent may also lead to the early development of food habits which are unduly opportunistic and are inappropriate to the needs of later life or improved fortunes.

Lack of incentive to avoid obesity is still a significant factor; many patients take pride in having "always been of good size", and overweight is not merely socially acceptable, but is erroneously associated in the minds of many with good health and general well-being.

The plethora of beauty contests and fashion displays which is now a feature of life in Trinidad may, if it serves no other useful purpose, at least alter the popular concept of desirable physical proportions.

Finally, there may be inherited factors contributing to overweight. Miss McCarthy's subjects gave a 51% positive history of familial obesity, and while this might equally well be due to familial eating habits, the possibility of a genetic factor cannot be overlooked.

However, even though it is now abundantly clear that the public health problems of the present and future are those concerned with chronic degenerative disease much of which is associated with diabetes and overweight, public awareness of the need for assessment and control of these two factors is slow to develop.

CAUSES OF THE HIGH INCIDENCE OF OBESITY

Constance McCarthy, in her study of obese women in Trinidad in 1963, found that many of them (over 50%) gained weight excessively at some period between the ages of 13 and 23 years, and that it is precisely during the post-adolescent years that Trinidadian women eat more and exercise less than at any other time of life up to the menopause.

Significantly, she found that obese women ate, on average, no more food, and no more of any particular type of food than the non-obese.

The crucial factor for some may therefore be "level of activity" rather than "level of food intake" and overeating is therefore relative to energy expenditure rather than absolute as compared with expected intake.

Relative lack of both employment and sporting opportunities for women may therefore be directly contributory to the problem, even as

Table 4

Deaths, and Death-Rate per 100,000 population, for Trinidad & Tobago

	1956		1966	
	Deaths	Death Rates	Deaths	Death Rates
Totals	7136	961.08	7060	709.67
Strokes	582	78.38	912	91.67
Hypertension with Heart Disease	199	26.8	323	32.47
Hypertension without mention of heart disease	162	21.82	69	6.99
Arteriosclerotic and degenerative heart disease	768	103.43	778	78.20
Diabetes	126	20.39	209	21.01
Cancer	466	62.7	591	64.13
Tuberculosis	169	22.76	50	5.02

Over this ten year period, while the total death rate has fallen, that from strokes, hypertension with heart disease, and diabetes mellitus has remained constant, or risen, showing the same pattern as cancer.

By contrast, the most important cause of death by infection, tuberculosis, has shown a marked decline.

Public health measures, improvements in environmental sanitation, and early detection by chest radiography have played a great part in the reduction of deaths from tuberculosis, and despite the good results there is, and rightly, no relaxation of vigilance.

Table 3 (cont'd)

Date	Place	Prevalence of Diabetes (percentage of population)
1951	Newmarket, Ontario, Canada	1.22
1962	Forfar, Scotland, U.K.	0.96
1961	Halstead, Essex, U.K.	1.25
1963	Bombay, India	2.64

From Report of W.H.O. Expert Committee on Diabetes Mellitus, 1965

It will be observed that the Trinidad figure is higher than that for the U.K. and North America despite the higher percentage of young people in our population and the well-known fact that the risk of developing diabetes increases with age.

The survey again supports the relationship between diabetes and overweight: 52.9% female Trinidadian diabetics, and 35.2% of male were found to be overweight.

Table 4 gives the figures for the most important causes of death (not including violence and accidents) in Trinidad and Tobago during the years 1956 and 1966. Both actual number of deaths and the death rate for the disease per 100,000 estimated mid-year population are shown, and the total deaths and death rate are given for comparison.

The 1961 Nutrition Survey of the West Indies, carried out by the Interdepartmental Committee on Nutrition for National Defense of the U.S. Armed Forces in cooperation with regional health services, showed that in these islands 24% of the non-pregnant non-lactating females of 15 years and over were at least 20 percent above "standard weight". Some differences between ethnic groups were found to exist: 17.4% of East Indian women, 19.2% of women of mixed race, and 31.1% of women of mainly African descent were obese.

The 1961 Diabetes Survey conducted by two Specialist Medical Officers of the Ministry of Health and an official of the Central Statistical office (Mr. F. Rampersad and Drs. T. Poon-King and M. Henry) revealed a striking incidence of this disease: 1.89% among the entire population, 3.45% among those over the age of 20 years, 2.1% among females, 1.53% among males, 2.37% among Indians, 1.44% among Negroes.

Table 3 shows, for comparison, the results of incidence surveys of this disease taken in different parts of the world.

Table 3

Results of Diabetes Detection Surveys in Various Countries

Date	Place	Prevalence of Diabetes (percentage of population)
1949	Oxford, Mass. U.S.A.	1.99

Table 2

Actual Death Rate by weight increments above normal expressed as a percentage of expected Death Rate

Lbs. variation from average weight	Men	Women
	79	101
+ 10	104	114
+ 15-20	113	109
+ 25-30	131	122
+ 30-45	144	120
+ 50-60	165	157
+ 65-80	223	?
+ 85		

From Boston Med. & Surg. J. 188,617. W.E. Preble 1923

It is interesting to compare the above data with what is known about the diabetic state Diabetics too are particularly susceptible to coronary artery disease, to strokes, and to gall stones, and face, if uncontrolled, special hazards during and after surgery and the process of childbearing.

In addition they may be crippled by deterioration in eyesight, they are at higher risk of infection of every kind, they often develop high blood pressure associated mainly with kidney disease, and they may lose a limb or limbs through loss of blood supply with or without infection and consequent gangrene.

Both obesity and diabetes are known to be of major importance in Trinidad & Tobago, the former particularly among women.

more will be said later.

Obese people are also known to be more prone to accidents, and to be at greater risk than those of normal weight during childbearing or when surgical operations have to be undergone.

Table 1 shows the actual death rate from five diseases among obese subjects expressed as a percentage of the Expected Death Rate from figures for the general population. This shows quite clearly the special relationship between weight and the diabetic state.

Table 1

Disease:	Male:	Female
Diabetes Mellitus	383	372
Cirrhosis	249	147
Strokes	159	162
Coronary Disease	142	175
Biliary Calculi	206	284

From "Overeating, Overweight and Obesity", R.S. Goodhart 1953, (New York, National Vitamin Foundation).

Table 2 shows the actual Death Rate from all causes of obese men and women, classified by weight increments above average, expressed as a percentage of the Expected Death Rate. While these figures seem to indicate that women, on the whole, tolerate the obese state rather better than men, they give neither sex any reason to be complacent about the development of so-called "middle-age spread".

OBESITY AND DIABETES MELLITUS IN TRINIDAD & TOBAGO

by
Dr. Neville Byam, Head, Nutrition Unit, Government of Trinidad & Tobago

Obesity may be loosely defined as excessive deposition of fat in the storage areas of the body, such as to lead to significant increase in weight, above the accepted average for height, sex and age.

"Significant" in this context is usually taken to mean 10 percent or more, and accepted averages have been worked out in most metropolitan and a few developing countries from data collected by examination of large samples of the populations.

It is important to stress that the weight increase is due to fat deposition since heavy manual labour and some forms of athletic endeavour may both lead to significant weight increases due to muscular development.

Gross obesity or overweight is easy to detect simply by observation, though borderline cases may require more sophisticated methods of diagnosis than are ordinarily available in clinical practice.

That health and life expectation are severely affected by overweight has long been recognized, particularly by life insurance companies, and many studies have established relationships between this condition and hypertension (high blood pressure), coronary artery disease, gall-bladder disease, degenerative conditions of the skeleton, liver cirrhosis, and particularly diabetes mellitus, of which

The effectiveness of past efforts could certainly be improved if attention were given to making really appropriate food mixtures for young children more speedily available, rather than previous, somewhat haphazard, "jumble-sale" approaches, with the despatch of whatever happens to be available at the time.

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CAJANOQUOTE: " An infant feeding formula made from high lysine corn has been introduced in a Latin American test market by CPC International. Three daily 8 oz. servings of the product, called Duryea, will cost less than two cents each and provide 100% of the daily recommended minimum protein requirement for infants. High lysine corn contains a good balance of the ten amino acids essential for proper mental and physical development while ordinary hybrid corn is deficient in two essential amino acids. Since corn is already the principal food of millions of South Americans, the introduction of the corn based formula is expected to be met with wide acceptance. Duryea is being manufactured and packaged in Cali, Colombia." - from War on Hunger News in 'Cereal Science Today' October, 1969.

pre-cooked product might be most suitable, insuring the boiling of contaminated water while minimizing fuel expenditure. Porridge, at least temporarily for young children, seems relatively acceptable in various cultures, as witnessed, for example, by the successful use of corn-soya-milk in the recent severe drought in rice-eating Bihar and in the continuing hostilities in cassava-eating Biafra.

For logistic reasons, the food should be compact and packaged in lightweight, weather and pest-proofed, easy-to-handle units.

Probably in most instances a vitamin and mineral fortified "triplex mix" would be most nutritionally and economically appropriate - that is, a mixture of staple cereal, a legume, and smaller quantities of expensive animal protein. Such a product has, for example, already been developed in the U.S.A. in the form of corn (maize) flour, soya flour, and dried skimmed milk.

However, as the cost effectiveness of the particular food has to be related to the agencies' over-all budget and continuing commitments, it may be more rational to use "double-mixes," such as the 2:1 corn (maize): red bean (*Ph. vulgaris*) flour employed successfully in Haiti as AK-1000 for the nutritional rehabilitation of both severe and moderate protein-calorie malnutrition.[6]

Disaster relief arouses ecumenical compassion and is a practical transnational move toward a genuine brotherhood of man.

Also, despite instructions to add to other foods in a powder form, dried skimmed milk is only too likely to be reconstituted as liquid milk, with the well-known risks for infants of diarrhea (both infective and lactose induced), of keratomalacia (unless the dried skimmed milk is reinforced with vitamin A, as is usually the case nowadays), and as an additional impetus to the decline of breast feeding.

What is needed is a balanced, low-cost mixture rich in calories and in good quality protein, and fortified with vitamins and minerals. Its base should be a cereal and, if technologically possible, it should contain 10 to 15 per cent fat as "compact calories." The protein content could be derived largely from leguminous seeds and oil seed concentrates, together with small quantities of animal protein, often in the form of dried skimmed milk.[4]

The type of food mixture might depend on several variables, including the agricultural resources of the donor country or area. It would have to be sufficiently rich both in protein and in calories to treat such severe protein-calorie malnutrition syndromes as kwashiorkor, as well as for the rehabilitation of less severely affected children. It would also have to be inexpensive, digestible, and capable of being prepared simply as a porridge, either on a three-stone village fire or in bulk at an issuing center. A partially

Emergency situations are certain to occur in the future, possibly with greater frequency in view of the precarious food supply in some increasingly overpopulated parts of the world. It seems timely that priority consideration be given by national voluntary organizations and other bodies both to the specific criteria of foods for young children in these circumstances,[2] and to the feasibility of stockpiling sufficient quantities of mixtures, or ingredients, in particular countries, or regional centers, to insure immediate availability in future disasters, or, alternatively, to make use of the demonstrated speed with which large manufacturers can produce basic mixtures in some technologically developed parts of the world, as, for example, the corn-soya (CSM) nonfat milk in the U.S.A. Major determinants will be the availability of operating industrial potential and the related logistics of supplies of raw materials.[3]

In the past, the important "classical" item issued has been dried skimmed milk. However, this not only seems to be in shorter supply on a world basis, but, as a largely animal protein source, it can be employed with more nutritional logic and economy as part of a "multimix"[3] with, for example, a cereal and a legume as other ingredients. It is wasteful of time, energy, money, and resources to distribute expensive protein foods, especially those of animal origin, when calorie requirements are not covered.[4]

emergencies involving large populations have occurred every few months, with the Bihar drought, the 1968 Iran earthquake, and the continuing Nigerian war as major recent examples.

In contrast with earlier times, modern electronic communications enable information to be received almost instantaneously, so that aid can be airlifted to any part of the world within hours or days.

The Nigerian war in particular has highlighted to the public at large the well-known extreme nutritional vulnerability of the young child, especially as regards protein-calorie malnutrition, and has emphasized yet again the priority of this age group in emergency feeding programs.

Not infrequently, the foods made available in emergency disaster relief are not sufficiently geared to the needs of young children and, more often, comprise a frequently inappropriate, ill-thought-out, *ad hoc* collection of hastily gathered locally available food surpluses, including Western-style infant foods and slimming mixtures (both with low nutrient values for cost) often slightly past the manufacturer's expiration date or purchased at very slightly reduced prices[1] as well as such "traditional" high-protein items as dried skimmed milk.

The development of new methods of contraception, such as the "morning-after" pill or a pill for men, may indeed provide a fillip to family planning programmes in various areas of the world. But it would be perilous to suppose that these or any other advances can provide a scientific solution to what is essentially a sociological and political problem. The International Federation for Planned Parenthood has every right to take pride in the growing number of countries that support or permit family planning activities. The fact remains that no government yet has a programme to reduce the desired family size. Nor, even if family planning programmes were fully successful in their objectives, is there any guarantee that the volitional behaviour of individual families would lead to a containment of the population explosion. It is naive to hope that individuals can be induced to regulate their family size in the best interests of society by persuasion alone, not by legislation. The seasonal fluctuations in the English birthrate are a vivid reminder that in these matters, at least, people are a law unto themselves.

Emergency Feeding of Young Children
Editorial by D.B.Jelliffe, the Journal of Pediatrics
Vol.75, July 1969, p.153.

Large socially disruptive disasters due either to natural or to man-made emergencies are no less frequent in the late Twentieth Century than throughout history. In the past five years, for example,

the family's role in society, that must be altered if the number of children traditionally desired is to be reduced. The kind of measures that could be needed include government action to deter early marriages, to encourage women to take up careers outside the home as a deliberate alternative to child-bearing, to abolish child allowances and other economic incentives to fecundity and to influence sexual mores away from a direction that drives the maximum number of people into fertile union.

Such radical measures are, for the moment at least, politically infeasible in almost all countries of the world, which may be part of the reason for the relative acceptability of family planning programmes. These seem to promise a solution in terms of medicine and public health, they are comparatively innocuous to political and religious sentiments, and they permit the impression that something is being done to contain the population explosion without the need for traumatic social changes. The obstacles in implementing even family planning programmes are a discouraging foretaste of those that will face the far more radical measures that may eventually be necessary. It is significant that the Family Planning Act and the Abortion Act became law not because of their effectiveness as demographic tools but because their sponsors were able to present them, as indeed they are, as measures designed to improve the quality of family life.

and social conditions it brought into play. People had fewer children because they wanted to, and the means at hand were demographically effective. Is the mere availability of modern contraceptives, together with a modicum of medical health propaganda, likely to persuade people to procreate less? Professor Kingsley Davis has argued (Science, 158, 730: 1967) that in countries such as Taiwan and South Korea, which are often upheld as models of what a family planning programme can achieve, it is hard to be sure that the programme has contributed more than marginally to a decline in birthrate that would have occurred anyway. Nor is it to be believed, if an analysis by Dr. Judith Blake is correct (Science, 164, 522; 1969), that family size among the poor and uneducated in the United States is a consequence of their lack of access to family planning advice. The poor have ample access to such advice.

Those who are optimistic about the potential influence of family planning programmes would appear to neglect the several factors other than the availability of contraceptive techniques that determine family size. These include not only traditional and religious attitudes to child-bearing but the whole range of social and economic incentives which each society has developed in order to assure its own continuity. These incentives are embodied in the structure of family life, the sanctity of which no politician, party or regime would publicly impugn. Unfortunately, it is the family, or at least people's expectations of

with the restraints on human ecology whose classic description is due to Malthus. It is entirely understandable that people should look for a cure to the same source that supplied the cause. From science and technology, the argument goes, will spring the new developments, such as the IR strains of rice, which will increase the food supply and buy the time to stabilize population growth with family planning programmes.

There are limits to the confidence that can be placed in this argument. For one thing it reeks of the fallacy of scientific omnipotence. For another, there are ominous signs, to which two distinguished American demographers have recently drawn attention, that it rests on a mistaken diagnosis of the problem. The implicit assumption of family planning programmes is that people would have fewer children than they do if adequate means of contraception were freely available to them. Though this is certainly true to some extent, the fact remains that the desired family size in countries ranging from the United States to Taiwan is considerably greater than that required to produce a stable population.

There is, too, the possibility that family planning programmes are largely irrelevant to demographic trends. Declining birthrate experienced by European countries in the nineteenth century was the consequence of the industrial revolution and the changing economic

BE FRUITFUL AND STARVE
Editorial, 'Nature', Vol. 223, Aug. 30, 1969, p.877

Festive occasions, such as next week's bank holiday, leave their mark in unexpected ways. If the accident statistics betoken how a large proportion of the population takes to the roads at such times, the Registrar General can deduce how people have their fling in other ways; the conception rate in England and Wales shoots abruptly upwards twice a year, during the summer holiday season and in the period between Christmas and the New Year. These fluctuations are more than a demographer's curiosity. As a demonstration of how social institutions can influence the birth rate, they are of the utmost pertinence to the population explosion which is now afoot in almost all countries of the world. As awareness of the problem has grown, so too has the number of those who believe it is capable of solution. The grounds for optimism, however, have if anything diminished.

Population projections are so often quoted that they have ceased to startle. It is taken for granted that world population will rise from 3,550 million to something like 6,130 million (the United Nations median estimate) by 2000, although it is less well known that even a comparatively stable population such as that of the United Kingdom will suffer a 24 per cent increase from 55 to 68 million in the same period. This unnatural bloom has been sustained over the past quarter of a century by the worldwide institution of public health programmes and the use of insecticides and antibiotics: in short, by tampering

only for a large production, which, in turn, seems to indicate that urban and institutional areas are the best suited for marketing this type of bread.

Baked goods other than bread also offer excellent possibilities - and with fewer problems. Biscuits and crackers which are high in protein content and quality can be made from indigenous ingredients. Structural problems associated with breadmaking are minimized. Biscuit and cracker doughs have a relatively high density; air cell structure becomes less important. The keeping quality of biscuits and crackers is longer than for bread; their packaging problems are simpler. One drawback must be mentioned: the high temperatures at which biscuits and crackers must be baked. These temperatures tend to cause protein quality damage. However, providing very fast uniform heating and reducing the bake time minimizes injury to the protein quality.

Despite the apparent problems and limitations, the incentives to create this ready-to-eat food remain strong. We can now visualize bread products, made to an increasing extent from indigenous crops, which are relatively low in cost, of good sanitary quality, high in protein content, excellent in protein quality, and with acceptable eating qualities.

For further information, please write to League for International Food Education, 1155 Sixteenth Street, N.W., Washington D.C. 20036, U.S.A. and request a copy of "Breadmaking Using Indigenous Foodstuffs". This reference list will also include a table indicating the present status of breadmaking using a maximum of indigenous ingredients.

peanut, and sesame seed, have been used as supplements. Fish protein concentrate has also been used. Minerals, vitamins, and essential amino acids, such as lysine, can also be added to make such breads more nearly complete foods.

There are other hurdles, too. Comparatively speaking, wheat flours are standardized and uniform. This is not true of non-wheat flours. They vary considerably in color, flavor, and physical properties.

In the beginning, replacing wheat with other flours frequently resulted in an unacceptable product. The new bread had the "wrong" color, texture, taste, and appearance. Thus, it was necessary to develop new processing techniques in order to get a manageable dough which would bake out more like the familiar wheat-based bread. The discovery of such dough conditioners as glyceryl monostearate, calcium stearyl lactylate, and the sucrose esters has made it possible to compensate, at least in part, for the deficient physical properties of the non-wheat cereals.

The advent of fast continuous dough processing systems has allowed greater flexibility in the use of non-wheat flour blends. Such systems result in greater uniformity of cell structure in the bread. Even a fluid, cake-like batter can be handled satisfactorily. However, the new dough processing systems require a considerable capital investment and sophisticated management. This can be justified

THE STAFF OF LIFE

From the Newsletter of the League for International Food Education
September 1969

For millenia, bread, and bread-like products, have been a major part of the diet of peoples in many areas of the world. Even when offered to people who have never before eaten them, bread products are generally accepted. It seems logical, therefore, to consider the possibility that bread, if made from good nutrients, could fill a basic food need in many developing countries.

But, as always, there are problems. For example, through the ages, the technology of breadmaking has been based on wheat. Eighty percent of the world's wheat is grown in the developed countries (Australia, Europe, New Zealand, Russia, and the United States). Yet, nearly 70% of the world's population lives outside these wheat-raising areas, mostly in the less developed countries. For these areas to make bread from wheat requires its importation. Most of the developing countries do not have an adequate export volume to provide the needed foreign currency.

One solution to this economic impasse is to reduce the amount of wheat needed by using maximum amounts of indigenous foodstuffs. Cassava, corn, and sorghum, which grow abundantly in many of the developing countries, have been tried. However, flours made from these crops are low in protein content. Consequently, other flours which are high in protein content, such as soya, cottonseed,

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Jelliffe, D.B. and Stanfield, J.P. (1968) Editorial: Para-auxiliaries and medical manpower in tropical pediatrics. Journal of Tropical Pediatrics. 14, 199.

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Stanfield, J.P. and Jelliffe, D.B. (1967) Monodosage - a Potential Compromise in Tropical Countries? Journal of Tropical Pediatrics. 13, 151

Finally, the hospital care and feeding of young children anywhere in the world, but especially in less developed tropical countries, must only be envisaged as a small, but important, part of an imaginative, practical, wide-spectrum Adaptive MCH Programme capable of delivering effective health and nutrition services related to priority problems, and adapted to the local ecology and to inevitable limitations of money and staff.

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of unnutritious items, or the "Trojan horse" techniques of sales promotion by free calendars, posters, booklets, or labelled samples related to impossibly expensive processed milks and infant foods "generously" donated by firms, or by the hospital kitchen supplying a diet quite different from that demonstrated by the nutrition educator.

CONCLUSION

Protein-calorie malnutrition is an immense and complex problem, with a high mortality and with increasing evidence of long-lasting ill-effects, especially brain damage. PCM is also a very extravagant group of conditions; for example, the annual cost of in-patient therapy of severe PCM in the English speaking Caribbean has been estimated to be about E.C. $1.7 million (Cook, 1968).

The protective and therapeutic importance of a diet with a full range of all nutrients has been appreciated for years, as, for example, foreshadowed by George Herbert in 1660, when he said:

> "Whatsoever is the father of a disease,
> an ill diet was the mother."

However, even three hundred years later, this aphorism needs practical application, in the tropical children's ward and elsewhere.

It is often impossible for over-extended nurses to undertake all the ward nutrition education, including demonstrations-discussions, although they must always be involved and taught. It may be useful and necessary to take on a separate cadre of aides - as, for example, what have been termed "MCH Demonstrators." Mothers must, themselves, always be involved practically, and the "old-hands" among them can assist with the actual demonstrations to new mothers. Free discussion acts as a method of both clarification and feed-back.

In some parts of the world, it may be possible to have a "day care" or a "residential" nutrition rehabilitation unit (Bengoa, 1967) adjacent to the ward, which can serve both to feed children "convalescing" after the ante phase of severe PCM has been overcome, and to expose mothers to practical experience in nutrition education. At the Mwanamugimu N.R.U. in Kampala, the mothers on discharge received a certificate to reinforce the importance of the new knowledge they had acquired, containing "before" and "after" Polaroid photos as reminders of the child's improvement.

Conversely, it is important to avoid the hospital unwittingly becoming a centre for "ill-health education" as, for example, by using and hence endorsing methods that mothers are not advised to follow (e.g. bottle-feeding), by permitting the direct advertisement

communities or, even in certain seasons flying ants in parts of Africa. Anywhere in the world, the culture pattern is strongly imprinted in the range of foods permissible and the feeding pattern. The psycho-therapeutic value of culturally evocative foods is obviously important for the hospitalized child.

Other cultural practices may be of special significance, as in New Guinea, where only solid foods are eaten, so that hospitalized young children have been fed with banana-peanut paste splits or with reconstituted balls of dried skim milk and water (Bailey, 1963). Likewise, the traditional methods of cooking must be known and should form the basis of hospital feeding and nutrition education. For example, in Buganda in East Africa, the practice of cooking in *ethu* (banana leaf packets) is usual and should, therefore, be adapted when devising appropriate hospital diets.

Lastly, and increasingly importantly, nutrition education in the hospital, or anywhere else, must include "consumer education" - an increasingly complex matter even for the trained nutritionist. The newly urbanized are particularly confused by the lures of a cash economy, and there is great need for positive guidance in the avoidance of highly advertised, but economically and culturally inappropriate or harmful infant foods.

Ideally, the tropical children's ward should be planned with nutrition education in mind - that is with facilities for mothers, planned, (rather than *ad hoc* adaptations), with room for demonstrations, with a basic kitchen for food preparation and, if practicable, with an adjacent garden, model low-cost house and even simple buildings for the rearing of small animals, such as chickens.

Coverage of nutrition education in hospitals can plainly encompass a wide range of nutrition-related topics, but will often be principally aimed at improving infant feeding, by ensuring an adequate intake of protein and calories in the first and second years of life. In more traditional circumstances, a major aim will be avoiding PCM of the vulnerable "secotrant" (Jelliffe, 1969) and, in this, concept of the "3-plank protein bridge" will often be helpful (Jelliffe, 1968a).

Details of the diet advised and the nutrition education promoted will have to take into account many factors, including local views concerning the most suitable food for young children, as with arrowroot in the West Indian island of St. Vincent, the prized cultural superfood - *matoke* (steamed plantain) in Buganda and corn (maize) in Guatemala and low cost sources of protein, whether pigeon peas in the Eastern Caribbean, fish in some island

All hospitals, in the tropics or elsewhere, should have at least some facilities for mothers to be admitted with their offspring. Interestingly, suggestively, and somewhat ironically, many better-to-do-mothers in various parts of the world insist, whenever they can, on accompanying their children when admitted to private wards or to nursing homes. The need is, in fact, much greater in the general pediatric ward of a tropical hospital for many reasons, in particular because of the potential of the mother - or even the father - in helping with the feeding and caring for their children, and because of the excellent opportunity for health education.

That the hospital should be a focal point for nutrition education is rarely appreciated or exploited sufficiently. If mothers are present (preferably admitted to the ward, but also when visiting), various situations can be made use of to motivate and to persuade. Firstly, the malnourished child's clinical improvement is the most vivid teaching aid, especially if mainly achieved by feeding, and particularly if reinforced by a demonstration of rapidly rising weight curves.

Also, mothers whose children are recovering would seem to constitute a particularly receptive group, both for individual discussion and for demonstrations.

while it also has a highly significant role in the feeding of premature babies, children ill with tetanus and other conditions.

In addition, it will usually be necessary to think of ways of acquiring - at low cost - extra knowledgeable and gentle hands for feeding purposes, and various approaches may be more suitable and practicable in different areas. In some places, this may be covered by recruitment of para-auxiliaries (such as nursing aides) (Jelliffe and Stanfield, 1968), or by the use of volunteers, or even by the employment of specific individuals as "feeding assistants."

It is, in this regard, that hospitals that permit mothers to be admitted with their children are at an advantage, despite admitted problems of extra expense for accommodation, toilets, food etc. and questions of ward tidiness and routine.

The mother's role is particularly vital when her baby is still at the stage of being a marsupialized, breast-fed, extera-gestate foetus (Jelliffe, 1968), to exclude her is a nutrition travesty, in fact, this is an added impetus to malnutrition. Under these circumstances, it is possible for a baby to recover from septicaemia of the newborn only to succumb to marasmus later as a result of his mother's hospitalization-induced lactation failure.

aides (King, Fougere, Foucald, Dominique and Beghin, 1966).

However, whatever form of *triage* of selection of alternatives, is devised, a varying percentage of severely malnourished children will have to be admitted to a ward whether in a hospital or health centre, especially those with severe anorexia, marked anaemia, dehydration, various infections or other complications, and for these, several approaches to improved hospital feeding may be relevant.

Firstly, as with much else of a nurse's work, analysis of her manifold activities is required, to see how much can be jettisoned as time-wasting ritual, such, for example, as the routine frequent taking of respiration rates on all patients, and how much, such as ward cleaning, can be carried out by some-one with less training. Conversely, the doctor needs to be convinced of the intensely limited time available to ward nursing staff, so that the details of treatment requested can be streamlined and therapeutic frills eliminated.

The nasal intra-gastric tube, using either a drip or intermittent feeds, is a most important aid to feeding young children in tropical wards, which is not infrequently under-used. Its value as an economical "anorexia-circumventor" and as time-saving aid for the nursing staff in the treatment of PCM is very great,

used foods, such as eggs for females in East Africa.

The mechanics of feeding large numbers of young children in hospital is rarely faced up to, nor are the risks of admission to over-crowded pediatric wards, nor the three psychological effects on "abandoned" young children admitted to the culturally alien surroundings of the concrete and glass modern hospital. Too often, the consequences of under feeding, of cross infection and of maternal depletion become cumulatively superimposed.

It seems timely to consider alternative methods of treatment of sick children in less developed countries, such as in small peripheral units attached to health centres, or by the use of some form of Nutrition Rehabilitation Centre for the malnourished, or even by home treatment (preferably with necessary drugs given by "monodosage" (Stanfield and Jelliffe, 1967) and supported by home visiting when possible).

That even children with kwashiorkor can be successfully treated with a simple, low cost protein-rich vegetable diet in Nutrition Rehabilitation Units has been demonstrated by Dr. William Fougère and colleagues in Haiti in "Community Mothercraft Centres," where children are tended and fed with a diet based on a corn-bean mixture by mothers supervised by trained, locally recruited

regions, especially the malnourished. This is by no means simple to achieve, as medical education is still too much influenced by models from Europe and North America, where serious malnutrition is not often a significant problem, hospital diets will usually be relatively abundant, and therapy will be mainly related to pharmaceuticals.

Imaginative adaptation is needed in designing appropriate diets for the tropical children's wards. Firstly, as already remarked, their cost/effectiveness must be as carefully analysed as, for example, the cheapest, most effective basic formula to be used for the treatment of kwashiorkor and other syndromes of protein-calorie malnutrition.

Adaptation must also be guided by modern, nutritional concepts, in particular, that protein with the full range of essential amino-acids can be effectively achieved, as well as calorie needs and requirements of vitamins and minerals, by low cost, largely vegetable "multimixes", based on appropriately supplementary blends of a staple, a legume and a dark green leafy vegetable, with, when possible, small quantities of animal protein.

Additionally, although the foods, dishes and their presentation must be based on local cultural considerations, at the same time, the episode of hospitalization can be used to introduce locally under-

Approaches. All too frequently the children's ward in some tropical countries are continually swamped with floods of sick children, mostly suffering from malnutrition, diarrhoea and various infections, or with synergistic mixtures of these.

Mothers may be excluded from the ward by policy, even those with breast-fed babies, and the young children admitted may then be crowded two or three in a cot, with an obviously increased likelihood of cross-infection. In extreme cases, the press of circumstances is such that the insufficient,harried nurses have great difficulty in finding time to feed the children adequately, but rather concentrate on injections and medicaments.

Even with malnourished children miraculously responding to often hit-and-run haphazard feeding, discharge is likely to be premature (because of bed-pressure), follow-up unusual, and the possibility of undocumented, possibly fatal relapse not unlikely on return home. Under these circumstances, there comes a point when it has to be asked if the children's ward has become a negative, or even a lethal, factor in the management of malnutrition, rather than a beneficial influence.

A basic need is for the education of administrators, doctors, nurses and other para-medical staff as to the crucial role of feeding in the therapy of all children hospitalized in less developed

is here that the nutritionist may be of much assistance in advising the pediatric staff, not only on calculations of the nutritional adequacy of the diets used, but also on the cost/nutrient values of different available foods. (McKigney, 1967).

Unfortunately, when economies have to be made in hospital budgets, it is very often the food items which are most likely to be cut as "domestic expense" rather than even less essential drugs which have a much greater therapeutic mystique.

A neglected aspect of the feeding of young children in tropical hospitals is the sheer question of hands and minutes. For example, "time and motion" study at a West Indian hospital showed that with fifty sick infants in the children's ward - many malnourished or anorexic - a conservative daily estimate of fifty nurse-hours would be required to feed them - an impossibility, when at some shifts only 2 - 3 nurses were on the ward at a time, with manifold other duties to complete.

Lastly, the foods and dishes making up the diets served should be relevant to the local culture, rather than based on imported ideas. Again, this may seem self-evident, but not infrequently the cabbage and tinned fruit of elsewhere are sought, rather than the available, less costly tropical amaranthus or papaya.

mainly equated with materia medica. It is, for example, unusual for doctors to think in terms of the therapeutic dosage of protein needed in the way they would for antibiotics. Still less recognized is the preventive need for essential nutrients, and the vital supportive role of diet in all pediatric therapy.

Additionally, a hospital feeding programme necessarily involves inter-action between several types of staff, including doctors, nurses, storekeepers, cooks, medical superintendents, and, if and when available, dietitians. Too frequently, they have little idea of their respective roles in relation to one another, and much could be achieved inexpensively by close contact and understanding, with, for example, meetings to ventilate problems and coordinate efforts. Again, the hierarchial rigidities of some hospital staff power structures may make this difficult in practice, too frequently, contact between nurses, dietitians and hospital superintendents consist of recriminations, based on lack of understanding and information. In particular, doctors need to appreciate, and make use of, the special knowledge of the dietitian as a full member of the team, rather than as a slightly superior minion in charge of cooks.

As with all aspects of health services, cost is a major concern and feeding in the children's ward has to be imaginatively devised within the harsh constraints of a limited budget. It

in the hospital must obviously be the effective, economical and speedy dietary treatment of these large numbers of severely or moderately malnourished young children, both for humanitarian reasons and to minimize the high cost of long hospitalization.

Secondly, an appropriate diet with adequate nutrients is needed for all children, and is plainly particularly required therapeutically for the children usually admitted to tropical hospitals, who are often not only basically undernourished, but are still further nutritionally stressed by multiple infections and parasitic burdens.

Thirdly, it is increasingly recognized that the hospital - the prime clinical bastion - must also have a preventive function as well as its classical curative role. In other words, the pediatric ward should be a centre for nutrition education.

Problems. Unfortunately, too often none of these three aims or purposes are adequately achieved or, indeed, really appreciated.

Various factors may be responsible for this common failure but, basically, the crux of the matter often lies with a lack of appreciation by medical and nursing staff. Their training may have included some knowledge (often of a rather outmoded type) concerning certain stylized types of therapeutic diet, such as "low fat" or "diabetic" etc. However, apart from this, treatment is reflexly

FEEDING CHILDREN IN HOSPITALS IN DEVELOPING COUNTRIES (or the Children's Ward as a Lethal Factor)*

D.B. Jelliffe

and

E.F.P. Jelliffe

It is universally agreed that the group of syndromes collectively termed protein-calorie malnutrition (PCM), and with kwashiorkor and marasmus as the two main syndromes, is the world's main nutritional health problem.

At the same time, strange anomalies and hiatuses exist with regard to feeding young children in many institutions in less developed tropical countries, and nowhere is this more so than in many hospital pediatric wards.

To appreciate these anomalies, inconsistencies and wasted opportunities, it is necessary to return to first principles and to try to define the aims or purposes of feeding young children in tropical hospitals.

Firstly, in most technically less developed countries, a high proportion of the young children admitted to the ward are either mainly suffering from severe PCM or have a "primary diagnosis" which is "nutrition-related", such as diarrhoeal disease. It is axiomatic, therefore, that a major purpose of any feeding programme

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* *Footnote* - Presented at the VIIIth International Congress of Nutrition, Prague, August 28, 1969.

C A J A N U S

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PROTEIN FOODS FOR THE CARIBBEAN

PROCEEDINGS OF A CONFERENCE

Held at
Georgetown Guyana
July 29–August 1 1968

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oily surrounding of the tinned sardine make mothers apprehensive, when one considers the widespread use of cod liver oil.

Q.10. *Goldfish food.* For some reason, pet foods (including those for ornamental fish) have great details of their ingredients and their nutrients listed on the container - not so the majority of infant foods or so-called "tonic foods" (it would be interesting to know what the latter increase the tone of?)

A well known brand of goldfish food is labelled as containing fishmeal, crabmeal, meatmeal, animal liver meal, shrimp meat, salmon egg meal, wheat germ meal, oat flour, soy flour, dried daphnia (water fleas), dried mosquito larvae, aniseed. The guaranteed analysis is given - minimum protein -37.50%, minimum fat 6.28% etc.

By contrast, a vociferously advertised "tonic-food" is labelled as containing unspecified quantities of and no indication is given of nutrients.

A visitor from deep space might conclude that goldfish are more important than children.

**

ANSWERS

Q.1. Buffalo milk has a high fat content, double that of most cows, but is *chalky white* because the fat contains no colouring carotene.

Q.2. A carminative is intended to help *bring up wind*. The term is an ancient one, derived from the obsolete word "carminate" - to card, or to disentangle, wool." Its archaic meaning refers to an ability to disentangle bodily "humours", including wind. Rather strangely, recent investigation has shown that some traditional carminatives, including peppermint and dill, work, producing a pinkish blush on the gastric mucosa and a relaxation of the cardiac opening of the stomach.

Q.3. *Potassium*. Hence its value as a tasty sterile high potassium drink for persons with severe diarrhoea.

Q.4. *Mangoes*, it is alleged; as easily available sources of calories and "natural convenience foods", needing no cooking.

Q.5. *Dried green peas (cheapest) and Bengal gram (chick peas)*, at least in June 1969. The chickpea was presumably introduced by the East Indian community; it needs high consideration in planning locally appropriate infant feeding.

Q.6. Emily Post was a celebrated Baltimore writer on social behaviour - "Etiquette" (1922) and "How to Behave as a Debutante" (1928). Rules are laid down as to what *foods can be eaten with the fingers* (e.g. asparagus, artichokes etc.), high-lighting the cultural relativity, arbitrariness, not to mention absurdity, of all groups "food ways".

Q.7. Hail, conquering *Carrot!* In some way the carrot (including carrot-juice for young children etc.) seems to have taken hold in Jamaica and in some other Caribbean islands. While not in any way anti-carrot, this vegetable seems to have achieved a reputation beyond its real virtues. One would like to know the story of the rise of the carrot, including the when, the why, and the how.

Q.8. Both *Tripneustes esculentus* = *sea eggs*. As is well known, the gonads are eaten raw or cooked in some Caribbean islands, especially Barbados, as in Mediterranean countries. One wonders why they are not used all over the West Indies?

Q.9. Sardines can be *recommended* in the weaning diet, probably best mashed up with other foods. It is strange that the

CARIBBEAN QUICK QUIZ
(Instant Information from Here and There)

Q.1. Buffalo milk is chalky-white/greyish/blue/yellow because - its fat is low in carotene/it is dilute/ it is coloured by buffalonic acid/it is oxidized on exposure to sunlight?

Q.2. A carminative colours food red/calms the eater/brings up wind/fills the empty stomach/relaxes the colon?

Q.3. Coconut water is high in protein/lactose/vitamin C/ potassium/hydrocyanic acid?

Q.4. Haitian General Toussaint l'Ouverture is said to have planned his campaigns to coincide with the season of a certain crop. Which was it? - egg plant/breadfruit/ mangoes/corn/sugar cane?

Q.5. The two cheapest legumes *in Trinidad* are red beans/ dried green peas/Bengal gram (chick peas)/pigeon peas/ soya beans?

Q.6. Emily Post's influence on feeding practices was because she discovered Post-Toasties/invented the penny stamp/ introduced "instant" meals/guided the inexperienced as to what foods could be eaten with the fingers?

Q.7. It is recognized that food habits usually change slowly. Nevertheless, one of the following vegetables seems to have acquired a special significance in Jamaica (and some other Caribbean countries) in recent decades. Which is this? avocado/Brussell sprouts/turnips/carrots/lettuce?

Q.8. Sea urchins are little boys diving for pennies/starfish/ pulsars/Tripneustes esculentus/sea eggs?

Q.9. Sardines are recognized as a low cost source of protein. However, for feeding to young children from 4 - 6 months on, sardines are taboo/likely to cause dyspepsia/poisonous/ recommended/toxic?

Q.10. Which of the following supermarket items are most likely to be clearly labelled with full details of nutrient content - glass jars of baby foods/breakfast cereals/ so-called "tonic foods"/goldfish foods/cereal-based infant foods?

(ANSWERS GIVEN OVERLEAF)

A major CFNI activity will take place on October 14 and 15 - the annual Policy Committee meeting. At this the following are expected to take part:-

PAHO/WHO - Dr. A. Drobny, Dr. J. Kevany, Dr. D. Wilson, Dr. P. Cavalie.

FAO - Dr. K.K.P.N. Rao, Dr. I. Kelton

Williams-Waterman Fund - Dr. Sam Smith

Government of Jamaica - Dr. M.A. Byer (Ministry of Health), Dr. D. McLaren (Ministry of Agriculture)

Government of Trinidad - Dr. M. Henry (Ministry of Health), Mr. Hamilton (Ministry of Agriculture)

University of the West Indies - Professor E.K. Cruickshank (Faculty of Medicine), Dr. K. Robinson (Faculty of Agriculture)

United Nations Development Programme - Mr. W. Cornwell

During this meeting the CFNI programme for 1968/9 will be reviewed and the programme for the coming year discussed and decided upon.

taken to discuss the most useful placing of the DCN students following the completion of their course.

The Proceedings of the Conference on Protein Foods for the Caribbean held in July 1968 in Georgetown, Guyana are now available in a published book of 128 pages. Copies may be obtained post free from the Bolivar Press, P.O. Box 413, Kingston 10, Jamaica, at a cost of U.S. $6.50 or J $5.40 per volume.

As a follow-up of the Georgetown Conference a joint FAO/PAHO/CFNI team will be visiting the English-speaking Caribbean for a 2-month period from late October, 1969 onwards. This "Protein Food Feasibility Team" will comprise the following persons:- Dr. F. Alvera - Food Technologist; Dr. R. Bressani, Nutritionist; Dr. S. Galpin, Marketing Economist; Dr. E. Montes, Agricultural Economist, Dr. N. Wilkie, Food Promotion Planner.

The team will be based on the two CFNI centres and will be joined by CFNI staff, and will work in collaboration with area PAHO and FAO personnel. The purpose of the team is to study the possibility of producing a protein processed food for families in the English-speaking Caribbean, but with special relation to young child feeding. It will be concerned with feasibility in relation to local production of ingredients, available food technology and marketing and acceptability.

CFNI NEWS

In August CFNI welcomed a new senior staff member, Miss Manuelita Zephirin. As mentioned in the last issue of Cajanus, Miss Zephirin will be stationed at the Trinidad Centre of CFNI and will be concerned with the investigation of current trends in institutional feeding in the Caribbean, with a special relation to the development of suitable training activities for the area. Since joining the staff, she has spent short periods in Jamaica and Trinidad, and has assisted in a PAHO training programme for hospital dietary services in Barbados from 12 - 28 September, 1969. She will be visiting the Zone Headquarters, Caracas, in the near future.

Miss Ann Brown, Lecturer in Nutrition, Queen Elizabeth College, London, is spending part of her sabbatical leave at CFNI, Jamaica to gain an insight into the problems of tropical nutrition.

During the past two months the Diploma in Community Nutrition students have been engaged in carrying out their field research projects in their home countries. Visits to students have been carried out by senior CFNI technical staff in the past few weeks. The reports of the projects are due at the CFNI Jamaica Centre by the end of October for assessment by UWI external and internal examiners.

In the course of visits to students, opportunities were

recipe and "Creme de Lentilles Rice".

If one is considering the value of several diets supplying equal amounts of calories and protein but differing in their proportion of fat and carbohydrates the protein concentration will obviously not be the same. Much research has been done in this area, and it has been calculated that a diet supplying less than 8% of calories in utilizable protein is incapable of meeting the needs of a young child (breast milk supplies around 8%).

This was a practical exercise and the net dietary protein value (NDpV) or net dietary protein calories per cent (NDpCal %) were not calculated. These considerations are most important but must not deter practical workers in the field of nutrition from elaborating their own multimixes so that we may over the years collect an excellent repertoire of suitable local weaning foods for our children thus helping to avert the disastrous nutritional diseases - kwashiorkor and marasmus.

principles of multimixes was clearly understood.

A mixture of a wide range of foodstuffs is more likely to provide the necessary nutritional requirements than a dietary containing only one or two categories of food. Proteins and calories are the main constitutents of a diet. In evaluating the quality of a diet one must consider the protein quality which depends on its amino acid composition. Thus, in the recipes used, for instance, the protein of a dark green leafy vegetable rich in lysine, but deficient in methionine, was complemented by a cereal or tuber lacking in lysine, but rich in methionine.

It is known that animal products and pulses have an excellent supplemental effect in regard to cereal diets, but in rice diets in which the lysine deficit is not so great, they will have a limited impact from the qualitative point of view, but will raise the protein calories. This would occur in our "Cook Up" recipe.

The efficiency of utilization of protein depends on the protein quality and the conditions under which it is eaten, for example the efficiency of utilization will be diminished if the calorie intake is too low or if protein is eaten in the large amounts when it will be converted into calories. EX: "Cook Up"

4. *1 mature coconut.* A nut with many virtues. The smooth jelly can be given as a "convenience" infant food, the"milk"is used traditionally in many West Indian recipes, the water has been used in many parts of the world as an oral and even at times as an intravenous rehydration fluid, though the latter procedure is not to be recommended because of the high potassium content of the water. Lastly, the mature coconut contains 3.5gm. protein per 100 gm.,27.2 fat is a good source of calories and a modest source of iron 1.8 mg. Cost: 10 cents E.C.

5: *one 11-oz. packet French Parakeet Food.* An attractive colourful package, offering free advice to bird lovers. With analysis of protein and fat contents of Millet and canary seeds. Millet is an excellent grain with a 12% protein content which has often been replaced in human dietaries by less nutritionally good foods such as cassava,as millet takes time to grow and prepare: crops are often ravaged by birds.

Price: Per 11-oz. 64 cents E.C.

The main message here was that very often pet foods are more clearly labelled from the nutritional point of view than products sold for human consumption.

The recipes devised by the students indicated that the

of the mixture, or by the year round availability of products used, the cost of recipe etc.), in all these recipes, it was decided that each team deserved a FIRST PRIZE.

The following "NUTRITION PRIZES" were awarded because of their "hidden" messages.

1st Prize: 1-lb. Kerrygold Dry Skim Milk (36g. protein per 100g.) excellent source of inexpensive animal protein. Attractively packaged and retailing at present for thesame price as the old style filled unlabelled plastic bag, relegated to the lower shelf in the supermarket: E.C. 39 cents.

2: one 14-oz. can of Pigeon Peas. Excellent source of vegetable protein (dry - 19.2 gm., green - 7.0g. per 100 gm.). It was locally canned (support home industry). It cost 0.55 cents E.C. But a reminder that it is not the cheapest legume in Trinidad (c.f. the g. split pea) - it is important to check the price of all legumes in each island seasonally and on a year round basis. A popular food.

3: one package 2-lb. parboiled rice. Imported from Guyana. Excellent source of vegetable protein (6.9 gm. per 100 gm.) chosen because of the method of processing which will help retain the thiamine content. Price: 48 cents E.C. Used widely in the West Indies.

2. The time spent on preparing these recipes varied. This was a learning exercise for both male and female students. It was thought that probably a housewife in her own surroundings might take less time to prepare these, though the cooking time would remain the same.

3. Emphasis was placed on the throwing away of the water in which the legumes had soaked overnight. It is known that these foods when raw may contain substances (saponins and alkaloids) antagonistic to digestion, inasmuch as they may inhibit the action of the enzyme trypsin. In malnourished children in whom malabsorption syndromes may occur, this factor could be important.

4. The amount of iron provided by each set of combined recipes exceeded the required amount. It is known that not all food iron is absorbed but the presence of protein especially of sulphur containing amino acids will enhance iron absorption.

Protein was available in all these recipes, from animal sources, such as D.S.M., fish or egg, or from vegetable foods, including lentils, pigeon peas and cow peas, rice, cornmeal, callaloo (spina and colocasia tops.

PRIZE DISTRIBUTION

Owing to the overall excellence of the dishes presented (minor points such as the dark colour of recipes containing green vegetables, was counteracted by the smooth texture, or the palatability

Quantities required for 2 meals out of 4 for the day	Calories $\frac{(1120)}{(2)}$ =560	Protein G $\frac{(17.5)}{(2)}$ = 8.8	Iron mg. $\frac{5}{2}$ =2.5	Vit.A $\frac{(300)}{2}$ =150 mg.	Riboflavin $\frac{0.06}{2}$=0.03	Ascorbic Acid $\frac{(15)}{2}$= 7.5mg
TEAM A	564	21.3	4.1	799	0.228	18.8
TEAM B	713	47.9	5.1	727	0.251	30.7
TEAM C	592	33.5	5.5	187.6	0.791	9.9
TEAM D	582	16.3	5.1	1.271	0.156	42.3
TEAM E	575	29.1	5.2	1.004	0.189	48.1

TABLE I : DAILY NUTRIENT ALLOWANCES PROVIDED BY 2 COMBINED RECIPES, EVOLVED BY EACH TEAM.

DISCUSSION

1. Several teams concluded that the most efficient way of preparing a multimix in terms of expenditure (fuel, physical effort and time) would be to serve the child from the "one pot" family meal, but in this case it was stressed that mothers should understand that all the crushed ingredients should be fed the child, nut just a piece of potato and gravy as so often is the case. The child should be served, prior to the incorporation in the recipe of hot spices (i.e. chillies).

Method of preparation: Soak codfish to remove salt, preferably overnight. Cut in very small portions. Clean callaloo and cut into small pieces. Place codfish, callaloo and onion in saucepan, cover with water, and allow to boil until tender - 15 minutes. Peel and wash bananas and pumpkin, place in saucepan, add water to cover and a little salt. Boil until soft and easy to crush - 15 - 20 minutes. Crush bananas and pumpkin separately whilst hot, adding a portion of the margarine. Press cooked callaloo and codfish through sieve, whilst hot, adding remaining portion of margarine. Mix callaloo and codfish with vegetables and serve.

Total cooking time: 45 minutes

Reasons for choice of ingredients Recipe 1

Promotion of use of legumes - the red bean is a good source of vegetanle and protein (22.8 gm. per 100 gm. edible portion) though lacking in the amino acid methionine, but with the judicious use of the tuber (sweet potato), this deficiency would be overcome. The most inexpensive source of animal protein (DSM) is chosen here.

Recipe 2. A relatively inexpensive source of animal protein (codfish) is used with a vegetable protein (Callaloo) which contains iron - the staple, the green banana, is well accepted. The introduction of the pumpkin enhances the vitamin A content of this recipe.

RESULTS

An array of attractive, palatable, inexpensive and well accepted recipes were produced by all teams and the combined recipes in each team covered more than adequately the desirable nutrients needs, as shown in Table I.

Some difficulties were encountered as some students had expressed their food values in terms of food as purchased (AP) and not as edible portion (E.P.) i.e. vegetables trimmed, peeled etc.

Recipe 1 "RED BEAN PURÉE" COST - 8 cents (E.C.).

Ingredients	Household Measures
Sweet Potato	1 oz.
Red beans	2 ozs.
Dry Skim Milk	2 heaped tablespoons
Margarine	1 teaspoon
Little onion	small sliver
salt	to taste
1 gill water	

Method of preparation: Soak beans overnight with a pinch of baking soda. Change water and boil until soft. Boil sweet potato until soft. Rub potato and beans through sieve. Mix Dry Skim Milk with water. Add potato, beans and margarine with chopped onion. Stir and salt to taste. Simmer for 5 minutes.

Recipe 2 "BABY'S DELIGHT MULTIMIX" - COST - 8 cents (E.C.)

Ingredients	Grams	Amounts Ounces
Green Banana	56	2 ounces
Callaloo (Spinach)	28	1 ounce
Salted Codfish	14	1/2 ounce
Pumpkin	56	2 ounces
Onion	10	Small piece
Margarine	19	1 teaspoon

Reasons for using ingredients

All foods used are inexpensive and will fit well into the cultural pattern of the West Indian Islands, and the vegetables are often grown in the home garden.

Recipe 1. The foods are locally available. Pigeon peas may be obtained fresh, dried (these are often stored in their pods in sacks or barrels) and may also be obtained at a reasonable price canned. Tannias are widely grown. The egg nestling in its hollow of the pea tannia mixture is the surprise in this recipe - chickens are often kept and in the season of glut, an egg costs around 10 cents (E.C.).

Recipe 2. Promotion of the virtues of dark green leafy vegetables is the reason for which spinach was chosen, as its protein content (2.2g. per 100g.) Iron (3.0mg. per 100g.) and vitamin content are often overlooked. The yellow sweet potato and pumpkin were used for their carotene content. The fortified (Vit.D and A) margarine was included to enhance calorie content and the Dry Skimmed Milk was an inexpensive source of animal protein.

TEAM E

Participants:	Mrs. J. Thompson	Home Economics Teacher (Barbados)
	Miss M. Regis	Home Economics Officer (Grenada)
	Mr. M. John	Agricultural Assistant (Grenada)
	Mrs. M. Forde	Staff Nurse (Barbados)
Observers:	Mr. H. Sealy	Senior Agricultural Assistant (Barbados)
	Miss E. Smith	Senior Community Development Officer (Home Economics) (Jamaica)

Method of preparation: Prepare and wash the vegetables. Cut up all vegetables into small pieces. Melt the butter and lightly fry the vegetables. Add the water and salt. Cover the pan and simmer carefully for about 30 minutes. Rub the soup through a sieve so as to get as much of the vegetables as possible. Mix the dry skim milk with quarter cup water and strain into the soup. Test the flavouring and then serve with toast or bread given separately.

Recipe 2 "CAJANUS TANNIA SURPRISE" Cost - 10 cents (E.C.)*
(Total cost 40 cents)

Ingredients	Household Measures
Eggs	2 eggs
Tannia	1-lb.
Butter	1-oz.
Pigeon peas	1/2-lb.

* In this recipe 1/4 of the total amount will be used for 1 meal.

Method of preparation: Scrub and boil tannia in the skin with salt. Boil peas, soaked overnight until tender. Peel and mash tannia until smooth. Rub peas through a strainer to discard skins. Mix well together the peas, tannia and butter. Pile the mixture into a greased dish, leaving a hollow in the centre. Break the egg and beat lightly (or leave whole), and pour carefully into hollow. Cover egg lightly with a little of tannia mixture. Brown quickly in a hot oven, by which time the egg will set. If no oven is available, cover the dish with some greased paper and steam for about 10 minutes. The egg set under the tannia covering is the big surprise.

Total cooking time: within 45 minutes

as well as enhancing the vitamin C content). This prejudice has evolved around an alleged outbreak of ptomaine poisoning in past years and remains a deeply rooted belief in many West Indian communities.

Recipe 2. It is felt that mothers should be encouraged to use legumes (split peas), an excellent source of protein and the judicious addition of Dry Skimmed Milk and rice adds to the protein value of these recipes.

TEAM D

Participants:	Mr. E.C. Clement	P.H. Inspector (Barbados)
	Mrs. M. D'Auvergne	Nutrition Officer (St. Lucia)
	Mrs. C. Joseph	Nutrition Education Officer (Trinidad)
	Mr. A. Ramjattan	Agricultural Assistant (Trinidad)
Observers:	Mr. L. Bhagwandat	P.H. Inspector (Jamaica)
	Mrs. L. O'Sullivan	P.H. Nurse (Jamaica)

Recipe 1 "SPINACH HIGHLIGHT" COST - 9 cents (E.C.)* (Total cost - 27 cents)

Ingredients	Household Measures
Spinach	1/2 lb.
Sweet potato	1/2 lb.
Pumpkin	1/4 lb.
Butter	1 tablespoon
Onion	1 only
Dry Skim Milk	3 tablespoons
Salt	to taste
1-1/2 pts. water or stock	

* In this recipe only 1/3 of this amount will be used for 1 meal for the infant.

sautéed spinach to cornmeal and continue cooking until the mixture begins to leave the side of the pot. Rub pigeon peas through a sieve and add to cornmeal mixture. Mash sardines with lime juice and add to the mixture. Add enough salt to taste. Serve.

Recipe 2 "CREME de LENTILLES RICE" - COST 7 cents (E.C.)

Ingredients	Grams	Amounts Ounces
Rice (parboiled)	28	1 ounce
Lentils	28	1 ounce
Dried Skim Milk	28	1 ounce
Sugar	7	1/4 ounce
Water	1/2 pint	

Method of preparation: Soak lentils overnight. Cook lentils in water until very soft. Mix Dried Skim Milk with water. Add cleaned rice and milk to lentils. Cook over low heat until very soft. Add sugar. Salt to taste. Serve.

Total cooking time: 45 minutes

Reasons for choice of ingredients

1. The staple foods in both recipes are familiar, well liked and used daily by groups in the Caribbean, i.e. cornmeal and parboiled rice.

2. In Recipe 1 callaloo (amaranthus) is used in conjunction with cornmeal because of its nutritional value and so that the dark, unappetising appearance of the spinach will be lightened by the gold colour of the corn.

3. The sardines, an inexpensive good source of protein, are used in order to prove acceptance by infants to the mothers who are frequently prejudiced against this useful and inexpensive fish. (A few drops of lime juice improves the palatability and odour

TEAM C

Participants:	Mr. O. Carter	P.H. Inspector (Barbados)
	Mrs. R. Evans	Lecturer in Food and Nutrition, School of Agriculture (Jamaica)
	Mr. D. Ramdath	Agricultural Assistant (Trinidad)
	Mrs. I. Riley	Home Economics Teacher (Barbados)
Observers:	Mrs. M. Griffiths	Public Health Nurse (Barbados)
	Mrs. J. Tapper	Home Economist (Jamaica)

Recipe 1 "TRINIDAD COU-COU" COST - 13 cents (E.C.).

Ingredients	Grams	Amounts Ounces
Cornmeal	28	1 ounce
Pigeon Peas	28	1 ounce
Spinach	14	1/2 ounce
Sardines	28	1 ounce
Margarine	4	1/8 ounce
Water		
Few drops of lime		

Method of preparation: *Cook pigeon peas with enough water until soft. Mix cornmeal with cold water to form a smooth paste and cook over low heat. Clean, wash, chop spinach and sauté in melted margarine. Add*

Recipe 2 (cont'd)

Ingredients	grams	Amounts ounces	Household Measures
Salt		to taste	to taste
Margarine	14	1/2 ounce	1/2 ounce
Dry Skim Milk	28	1 ounce	1 ounce

Method of preparation: Peel the potato, wash and cut into small pieces. Strip and wash the dasheen leaves. Cut into small pieces. Clean fish. Wash and sprinkle with salt. Cook the potato and dasheen in a very small quantity of boiling salted water. When the potatoes are half cooked add the fish, margarine and lime juice. Simmer until the fish is cooked and the potato soft. Remove the potato and the dasheen leaves from the pot. Crush together until smooth. Remove the bones and flake the fish. Add to mixture with dry skim milk. Mix well using the liquid in which the fish and vegetables were cooked in order to get a smooth soft texture. Serve.

Total cooking time: 40 minutes

Reasons for choice of ingredients

1. They are economical
2. They are used as a "one pot" meal and thus reduce the use of utensils and fuel.
3. They are of good nutritional value and suited to the needs of the child.
4. The foods used are available most of the year and the vegetables may be easily grown in the backyard garden.
5. The dishes are easily prepared using little skill and are of a good texture, and of a good appearance.
6. The dishes have proved very acceptable.
7. These dishes will retain their good taste and appearance when left to stand for hours, suitably protected from dust and insects.
8. They may be eaten hot or cold.

Observers: Miss D. Bramble — Teacher (Montserrat)

Miss I.L. Josiah — Home Economics Teacher (Antigua)

Recipe 1 "COOK UP" COST - 11 cents (E.C.)

Ingredients	Grams	Amounts Ounces	Household Measures
Rice	28	1 ounce	1 fistfull
Pumpkin	28	1 ounce	1 fistfull
Cow peas	28	1 ounce	2 yard long beans
Cod fish	28	1 ounce	1 ounce
Margarine	14	1/2 ounce	1/2 ounce
Salt		to taste	to taste

Method of preparation: Remove the seeds, peel and wash the pumpkin. Wash the beans. Wash the cod fish. Remove the skin and bones. Cut the pumpkin, beans and cod fish into small pieces. Measure the rice, and in a small saucepan, put 4 times as much water as rice. Add the pumpkin, beans and cod fish. Bring to the boil and cook until vegetables are soft enough to be crushed if pressed between the thumb and first finger. Wash rice. Add to the vegetables and cook until rice is soft and water is all dried out. Stir in margarine. Remove from fire and serve.

Recipe 2 "FISH N' CO" COST - 10 cents (E.C.).

Ingredients	Grams	Amounts Ounces	Household Measures
Sweet Potato	56	2 ounces	approx.size of large egg
Dasheen Tops (Colocasia)	28	1 ounce	2 dasheen leaves
Fresh Fish	28	1 ounce	2 small fish
Lime juice	-	4-6 drops	4-6 drops

Cont'd...

Method of preparation: Wash peas and put to boil. Peel and cut yam into small pieces, and add to peas when almost soft. Steam spinach on buttered plate over pot in which peas and yam are being cooked. Dissolve Dried Skim Milk in 1 tablespoonful water, mixing to a smooth paste. When cooked, sieve together peas, yam and spinach. Add milk slowly to these combined ingredients and mix to a soft creamy consistency. Total cooking time: 30 minutes.

Reasons for choice of ingredients

Recipe 1

1. Yam was chosen because it is a local staple, low in protein but high in calories.
2. Split peas are legumes, thus good source of protein and although low in methionine, the Dried Skim Milk compensated for the amino-acid deficiency.
3. The Dried Skim Milk and split peas also ensured a good combination of animal and vegetable protein.

Recipe 2

1. Rice is a staple which is relatively high in protein (6.7 g. per 100 g.).
2. Pumpkin was chosen because of its carotene content, and because it is soft, easily mashed and well digested by infants.
3. Fresh fish was used as a source of animal protein.
4. It was felt that the combination of animal and vegetable proteins was a most desirable practice.

TEAM B

Participants:		
	Miss B. Allen	Home Economics Organizer (St. Vincent)
	Dr. C. Casaclang	School Physician (Philippines)
	Mrs. S. King	Teacher (Antigua)
	Dr. A. Padlan	Physician (Philippines) Chief, Division Nutrition, Bureau of Health Service.

Miss C. Browne	Vice Principal, Carnegie College (Guyana)
Miss H. Brookes	Teacher (Nevis)
Mr. S. Dey	Community Development Officer (Guyana)
Observers: Mrs. M.Daly-Johnson	Health Visitor (Trinidad)
Mrs. G. Grant	Ward Sister (Queen Elizabeth Hospital, (Barbados)

Recipe 1 "INFANT'S KEDGEREE" - COST 9 cents (E.C.)

Ingredients	Grams	Household Measures
Parboiled Rice	50	1-1/2 tblsps.
Diced Pumpkin	60	1-1/2 cups
Flaked Cooked Fish	30	1-1/2 tblsps.
Fortified Margarine	8	1 level tsp.
Peeled Yam	60	1/3 cup
Split peas	40	1-1/2 tblsps.
Chopped spinach	20	2 tblsps.
Dry Skim Milk	10	1 tblsp.

Method of preparation: *Dice pumpkin after peeling it, boil rice and when cooked, add diced pumpkin. Steam fish on buttered plate over pot in which rice and pumpkin are being cooked, and then flake fish. Rub mixture of rice and pumpkin through sieve. Add flaked fish to mixture and mix thoroughly. Add salt to taste.*

Recipe 2 "CARIBBEAN DELIGHT" - COST 10 cents (E.C)

Ingredients	Grams	Household Measures
Peeled Yam	60	1/3 cup
Split Peas	40	1-1/2 tablespoons
Chopped spinach	20	2 tablespoons
Dry Skim Milk	10	1 tablespoon
Fortified Margarine	8	1 level teaspoon

equipment, i.e. one pot, one strainer, etc. and types of measures that would be available in less well equipped homes.

PURCHASING OF FOODS

Economy was the motto but the problem encountered was the difficulty in purchasing small enough quantities of material to make these two recipes. Two major techniques were used:

A. Purchasing a large quantity and evaluating the cost per ounce of the commodity (the rest of the food was used for demonstration and taste panel);

B. Persuading the owners of small grocery stores, to whom the situation was explained, to sell the required quantities. Naturally the food bought in small quantities would prove more expensive to the housewife, but on a limited budget, it is sometimes necessary to buy margarine by the spoonful or one egg at a time.

Costing of recipes. The recipes were priced according to the cost of foods as purchased, i.e. edible portion and refuse.

Measures. The anticipated difficulty of no standard type of measure for all homes was encountered - re-emphasizing the need to know, when advising on nutritional matters, what actual measures are used in the area, type and size of spoon, what is meant by a cup, (i.e. 8 ozs. or 10 ozs. teacup, coffee cup, etc.). The household measures used by the teams will, therefore, not be identical.

TEAM A

Participants: Mr. W. Allen — Senior Public Health Inspector (Jamaica)

The recipes will be judged on these points as well as the: appearance of the finished infant food, presentation and colour; taste, (texture, flavour), cooking method chosen, originality of recipe.

The students were given examples of types of multimixes used in other countries, it was emphasized that local products were to be utilized. The FAO food composition tables were employed by them. It was requested that in the recipes, quantities of food should be expressed in terms of gm., lbs., and ozs., and also if possible household measures. The students were divided into five teams comprising both male and female students, with 4 cooks and 2 observers. The observers had been asked to present a play in the afternoon in which methods and means of convincing families to introduce multimixes at an early age were to be demonstrated. The play was entitled "Teaching Grannie to Suck Eggs - Only Better."

Cooking premises - the students were permitted to work in the homes of friends or in their own lodging, i.e. with all available facilities, good lighting, ventilation, running water, refrigerator, including adequate gas or electric stoves. It is realized that these surroundings would not represent the facilities to be found in some of the homes in lower socio-economic groups where the challenge to perform the cooking exercise would be much greater. This was borne in mind by all the teams who used as much as possible the minimum of

WEANING MULTIMIXES FOR THE CARIBBEAN

A PRACTICAL EXERCISE

by the

DIPLOMA IN COMMUNITY NUTRITION STUDENTS

E. F. P. Jelliffe
(Caribbean Food and Nutrition Institute, Jamaica)

The main nutritional deficiencies found among infants and young children in the Commonwealth Caribbean have been related to a lack of protein with at times an associated calorie deficiency and an occasional lack of riboflavin, vitamin A and C.

In the Diploma of Community Nutrition course, the students became well versed in the knowledge of the nutritional requirements of different age groups, and the theory of infant feeding. However, as practical application of principles is necessary, the following problem was posed to them.

PROBLEM. The daily nutrient allowances, in respect of the above-mentioned nutrients, for a 9 month old infant weighing 8 kg. have been estimated to be - calories 1150, protein 17.5 g., iron 5 mg., vitamin A (retinol) 300 micograms, riboflavin 0.06 mg., ascorbic acid 15 mg. A child of that age requires 4 meals a day. Please prepare 2 recipes which would together cover approximately half of the daily recommended allowances stating (1) the cost of ingredients, (2) ease of preparation, (3) difficulties encountered, (4) time taken to prepare recipe, as well as cooking time in relation to expenditure on fuel, (5) acceptability by adults and infants if possible.

banana (J$0.18 for 4-1/2 oz.) compared with fresh Lacatan bananas, costing about J$0.30 per dozen in Kingston in October, 1969. With a more expensive preparation i.e. beef and beef heart (J $0.33 for 3-1/2 oz.) the contents may be stretched over several feeds, and the child's nutrition is just as likely to be inadequate as if he were receiving a diet of home crushed potatoes alone. The convenience factor of commercial strained baby foods is not denied, but in the local context, for the majority it is far better for the child to eat if possible a freshly prepared portion of an appetising mixture from the family pot with no extra fuel expenditure, which will hopefully give him a judicious blend of the necessary ingredients.

The need for continuous nutrition education for many of our mothers still exists, but medical staff and nutrition workers in our hospitals and clinics are pursuing this task. So let us all support our West Indian recipes and promote widely the use of our home grown foods.

exclusively a West Indian pattern) and they will return home, already very tired, having to face the cooking and household chores. But a family or a woman alone with a total income of no more than J$10.00 a week, out of which rent, clothes, and other necessities must be provided, as well as the feeding of maybe two or three other children cannot possibly afford to spend at least J$3.64 a week exclusively on tinned strained foods- for two of the infant's meals a day, excluding milk, juice, cereals, etc., he will also require for adequate nutrition, especially for the additional calories required.

The vitamin C content of processed foods is often good, and sterility of the product when purchased is presumed to be excellent, but once the jar is opened, no magical formula will prevent its contamination from flies or bacteria, any more than the uncovered home cooked product. If no refrigeration facilities are available and the child does not eat up the contents of the jar, it will be wasted or given to another member of the household. With his unbiased palate, the infant is just as likely to spit out the strained peas (J$0.19 for 4-1/2 oz.) as the home pureed pigeon peas (J$0.40 per pint) which may be growing in the garden.

A mother with little income, but striving to be "with it", is very likely to buy the least expensive preparation i.e. strained

YOUR QUESTIONS ANSWERED

Q. *In the Jamaica Gleaner (July 31) an article from a London newspaper was reprinted. It was entitled "Should you prepare your own baby food? It stressed the inconvenience and time wasted, the lack of sterility and poorly balanced dietary obtained from home prepared baby foods and praised the overall qualities in this respect of the widely available commercially prepared infant mixtures. What are your views on this subject?"*

A. It is rather unfortunate that an article promoting the use of proprietary foods should be given prominence in a newspaper with such a wide circulation. It gives a totally biased view on infant nutrition and if taken literally would imply that all our Jamaican mothers are poor housekeepers, without knowledge of nutritional matters, impossible cooks, and more importantly, that all of them are wealthy enough to feed their infants exclusively on these excellent but expensive infant preparations.

If one goes home visiting, we are happy to say that we can still see our babies eating up their crushed rice and peas, their fish stew and crushed potatoes, pumpkin and callaloo. Red beans, pigeon peas and chick peas are culturally well accepted in the West Indies, as are parboiled rice and cornmeal and our available ground provisions. Our chickens have not as yet gone on strike, and many green leafy vegetables grow wild in the patch behind the house. Nature's prepackaged foods, such as the citrus, ripe banana, papaya, avocado pear, coconut jelly are still available. We are well aware that many of our mothers are obliged to go out to work (this is not

and discussing common problems);

(b) collaboration on ways of disseminating new material, new techniques, new information;

(c) collaboration on ways of improving dietary services;

(d) organizing refresher courses and in-service education programmes;

(e) encouraging closer and more intensified relationships with allied associations.

This coordination and communication will provide a membership that will be thinking and working toward a common goal.

The dietitians in the area have not been able to break away from some of the work responsibilities which might better be handled by auxiliary personnel and are not able to spend their time organizing their departments to provide improved service. There is a need for a redefinition of the responsibilities of dietitians and food service supervisors.

The food service section represents a considerable proportion of hospital costs and a large commitment of personnel. The active interest and support of the medical nursing and administrative staff is a most important factor in determining whether this section can fulfill its full role in the work of a hospital.

Delegation is occurring in many hospitals but it is limited.

Efforts must be made to ensure that these sub-professional personnel are assisted in obtaining the necessary training. Personnel who have potential for such responsibilities as initial interviews with patients, adjustment of pre-planned menus, supervision of food preparation and service can have these successfully delegated to them. A bachelor's degree and completion of a dietetic internship are not essential for activities of this type.

(3) REGIONAL PLAN FOR ORGANIZATION OF DIETARY SERVICES

A regional plan within each territory would appear to be desirable to fully utilize the trained dietitians. These dietetic specialists would plan, coordinate and evaluate the food service system in the main hospital and in other health care facilities. Responsibility for all supervision that is repetitive or routine would be delegated to auxiliary personnel who have had adequate preparation for these roles.

(4) FORMATION OF A REGIONAL DIETETIC ASSOCIATION WITH LOCAL BRANCHES

The initiation of this association would provide opportunities for:

(a) organized group meetings where problems, programmes and objectives can be discussed and ideas exchanged. (Many dietitians have expressed the desire for "getting together"

do it alone. A number of avenues need to be explored to help institutions improve their food service. Some suggestions might be:-

(1) THE TEAM APPROACH

A strong team effort is required. The skill of its staff at all levels is the key to efficiency in a modern hospital; department heads can no longer concentrate exclusively on local departmental problems.

The hospital food service as well as other hospital services must revolve in harmony around the patient rather than each dealing with the patient individually.

In order to achieve best results, the dietitian must connect her services and professional relationships in a complete circle linking the administrator, the physician, the nurse and other staff. Communication lines between the patient, physician, nurse and dietitian must be kept open at all times.

(2) UTILIZATION OF SUPPORTIVE PERSONNEL

Competent supervision by trained supervisors who will organize, direct, motivate and train kitchen personnel is a priority.

There is a shortage of professional dietitians and supportive personnel must be utilized. One way of doing this would be to consider more extensive delegation of responsibility to auxiliary personnel.

guidance of the public health department should be utilized.

The food service employee is the greatest potential source of food-borne infections and awareness of the preventive actions that must be taken to reduce this hazard must be considered.

Food storage is a priority area, both from the standpoint of sanitation and economics. Loss due to spoilage or insects and rodents is far too frequent.

Equipment. Too often kitchen equipment is low on the hospital equipment replacement and repair list since the priorities for other equipment seems so high. Lack of adequate kitchen equipment is a major deterrent to efficient food service.

Budgets and Cost Control. Methods of determining the dietary budget vary. In some hospitals food costs are budgeted on a per diem basis for patients but costs have not been revised for several years and this makes it difficult to follow even the established diet scales.

Record keeping which contributes to the calculation of a daily food cost and which provides information for cost analysis and budgeting need to be encouraged. Record forms for meal census and inventory need to be developed.

POSSIBLE SOLUTIONS

None of the problems is unsurmountable but dietitians cannot

Employees are unsure of policies and this often creates misunderstandings.

Steps towards the well organized kitchen involve advance menu planning, standardized recipes, work schedules and systematic ordering by means of accurate inventory records. Careful menu planning is the basis for the successful operation of a hospital food service department, yet in many instances there are no planned menus. Purchasing is done first and menus written later.

Diets. In hospitals where there is no dietitian, dietary orders as written by the physician are put into effect by nurses, stewards, dispensers or cooks with little or no knowledge of nutrition and dietetics. Thus many of the resulting practices are based on misinformation, misunderstanding and personal opinion.

It is generally accepted that nutrition is essential to health. If hospitals are primarily concerned with the health needs of people, it would seem to follow that a major contributor to health, adequate nutrition, should be given priority and that diet scales should be reviewed and revised where necessary.

Sanitation. A food service sanitation programme is needed to integrate and incorporate into day to day practice the methods of efficient and effective sanitary procedures. The assistance and

service department.

Food Supervisors. In most instances the person responsible for food service is a supervisor (also called housekeeper in many territories) since the economic resources of hospitals and manpower resources of the dietetic profession favour this.

The experience and educational backgrounds of this group vary widely. Few have received formal preparation for the daily management responsibilities assigned to them and are unable to function as effectively as would be desirable.

With careful selection, training and experience, this group has a most important role to play in hospital food service.

Cooks. Many of the cooks employed in hospitals are untrained. In some territories an attempt is being made to have them attend cookery classes but these classes are not geared to the needs of hospital food service.

A planned inservice training programme designed to meet hospital needs would be more valuable.

Organization. No matter how small the facility, written policies are an aid to a smooth operation. Well defined lines of authority and policies of the food service department need to be established.

and Canadian Dietetic Associations are used as a reference standard. These include a Bachelor's degree from an accredited College or University with a major in foods and nutrition, institution or restaurant management, followed by the completion of an approved dietetic internship of one year's duration.

With this background of training, the dietitian is qualified for technical and administrative functions and can provide valuable assistance to the Hospital Administrator and to the physician.

To the Hospital Administrator her prime responsibilities would be the overall managerial functions involved in maintaining a well-organized and effective operation. This includes planning and developing inservice training programmes for dietary staff, determining appropriate policies for the department and developing the therapeutic and educational aspects of the hospital dietetic programme.

To the physician, the dietitian acts as a consultant and resource person in all areas of diet therapy and nutrition and teaches the patient to fulfill these needs.

Dietitians must be given the opportunity to share in the coordination and evaluation of departmental activities to ensure that the food service department functions effectively from the standpoint of the patient, the hospital administrator and the staff of the food

The term dietitian has come to mean many things to many people. Most people think of a dietitian chiefly as a cook, or a menu planner, (a dietitian today cooks only for her own pleasure and menu planning is only one facet of her activities), others consider her a happy hostess - someone to serve good wholesome food.

How do the hospital staff view the dietitian? To the hospital administration she is a food service manager who knows how to plan, organize, supervise and control. To the medical and other paramedical staff, she is a translator of modified diet prescriptions into palatable food for the patient. To the patient she is a "glorified cook". To the kitchen staff, she is the "boss lady".

The word dietitian fails to imply a special knowledge of the science of nutrition or expertness in applying the principles of this science to the treatment of disease. As soon as it is understood that the dietitian is a food service executive and a teacher and not a preparer of foods and a half qualified nurse, her position in the hospital will be much more pleasant.

What then is the educational background of a dietitian and what should be her main responsibilities in the hospital? Since most of the dietitians in this area were trained in North America, the minimum requirements established for membership in the American

What are some of these problems?

Lack of Trained Staff

Attention needs to be given to improved selection and training of food service staff and to the more efficient utilization of those already trained.

The Dietitian

There are professionally qualified dietitians in some of the territories and though few in number, they are providing excellent services which are numerous and commendable, but these services need to be enlarged and intensified in order to place dietetics in its rightful place.

Despite the many challenges which daily present themselves, the attitude, enthusiasm and undaunted spirit of the dietitians indicate that with the necessary support they can bring about improvement in hospital food service.

Interviews with the dietitians revealed several problems concerning dietitians. One of the main difficulties is that in general people are not aware of the specialized knowledge and qualifications which dietitians possess. Consequently, dietitians are not being used as effectively as they might be. They find themselves "bogged down" by routine duties which could be delegated to auxiliary personnel.

HOSPITAL FOOD SERVICE IN THE CARIBBEAN

by

M. ZEPHIRIN
(Caribbean Food & Nutrition Institute)

Food Service in many hospitals has continued without the adequate supervision or organization consistent with the scope and complexity of a hospital food service. An efficient food service should contribute to the well-being of patients by providing proper diets and to the successful administration of the hospital by controlling operational costs. Despite the keenness shown by some hospital administrators, the food service sections of hospitals do not appear to be accomplishing this.

Most hospital administrators agree that the hospital food service is one of the more potent factors in public relations. Many patients find themselves in a strange new environment with many new things happening to them. The one familiar thing to them is food and they feel exceptionally well qualified to pass judgement. If the food is acceptable they are more likely to judge other hospital services as acceptable. Yet food service sections are not receiving adequate attention.

Visits to several hospitals in the Caribbean area and interviews with various hospital administrators, dietitians, food service supervisors and workers revealed that problems in hospital food service are similar throughout the area.

rice along with modern handling, weighing, grading, and bagging equipment. When complete, storage capacity at each site for milled rice is estimated at 10,000 metric tons, which can be increased. Mobile units will be employed to transport dried paddy to mills and, in turn, take milled rice to storage centers. Road and milling improvements, 618-acre Rice Research Center, and technical managerial assistance are among subprojects included in program. Scheduled completion date for entire project is March, 1971.

Loan is based on studies which show that Guyana's current rice yields can be doubled by using improved seed and cultivation techniques, but that resulting gains in food production could be wiped out without dramatic improvements in post-harvest conditions. Plan is aimed at increasing rice yields while decreasing grain losses.

* * * *

READER'S LETTER

Dear Sir:

I have just read "Cajanus" No. 9 with great interest. As an addition to the information given on page 241 regarding the Banana Flower, the following may be of interest to Dr. Usborne. Platt in the publication "Tables of Representative Values of Foods Commonly Used in Tropical Countries" published by the Medical Research Council: gives the following nutrient composition for Banana Flowers (quantities per 100g. of edible portion): Calories-29, Protein - 1.4g., Fat - 0.4g., Carbohydrate - 5g., Calcium - 40 mg., Iron - 0.3 mg., Vitamin A - 100 i.u., Thiamine - 0.02 mg., Riboflavin - 0.03 mg., Nicotinamide - 0.4 mg., Ascorbic Acid - 1-12 mg.

It would appear that they would make a contribution of useful nutrients to the diet.

Yours faithfully,

John P.K. Dobson, M.D., D.P.H.
Associate Professor & Clinical Director of Nutrition, University of Michigan.

An official of the ministry said yesterday that for some time now the ministry had been examining the question of a modern kitchen for the hospital to meet the needs of the patients and at the same time ease the work of the cooks.

The present kitchen was erected more than 15 years ago and much of the equipment used there had become outdated, thus hampering the smooth running of the kitchen and sometimes causing meals to be late.

Officials of the Ministry of Works and Hydraulics have already been called in and work on the construction of the new kitchen is expected to commence shortly.

GUYANAN RICE INDUSTRY TO BE IMPROVED
From 'Cereal Science Today', June 1969

A $12.9 million loan from Agency for International Development will help Guyana modernize all phases of its rice industry during the next two years, including storage, receiving, handling, cleaning, drying and grading. Country will contribute $4.6 million of own funds, in program which includes construction of six modern rice storage and drying centers, each with grain handling capacity of 1000 bushels per hour. Centers will provide storage silos for milled

But at an accounting early this year it was found that the herd had far over-shot the mark and numbered 5,418 sows, and even at this excess there were qualified observers who would not swear that the actual number does not exceed 6,000.

Some sources at the moment reckon that 120,000 pigs a year are being turned out on the market. Others, more conservative, place the number at 100,000 head. If it is taken that local annual consumption is 70,000 or even 75,000 head, this means that at least 25,000 porkers are now being produced in excess of what the market can absorb.

In terms of potential, the overseas markets of which Messrs. Gyles and McLaren have been speaking should easily absorb this quantity, and perhaps ask for more. The problem with pig farmers is that their surplus pigs are very much here and now on the spot, and they have no idea how ready the new markets are to take the surplus pork.

MODERN KITCHEN FOR GEORGETOWN HOSPITAL
From the Guyana Graphic, Monday, 28 July 1968.

The Ministry of Health is to erect a modern kitchen at the Georgetown Hospital, which with its equipment will cost more than $39,000.

of farmers who responded to the Government's appeal to grow pigs for Independence and to offset the effects of devaluation are now finding themselves with pigs for which there is no market. It is also reality that every week that farmers are obliged to hold over pigs that have reached the marketing stage brings appreciable losses for such farmers, and that if this glut continues for too many weeks many of the farmers will face heavy loss.

Either Mr. Gyles or Mr. McLaren or both should say what are the sizes of the orders in hand, what are the prospects for quickly following orders. They should relate both the actuality and the soundly based prospects to the number of surplus pigs which it is known the island is producing. Only this way will farmers be braced to stand up to the hardships they are undoubtedly bearing, and also have some real confidence in what the two Ministers have been saying.

Something of the extent to which farmers are now over-producing pigs can be gauged from the circumstance that Mr. Gyles' own technical officers last year calculated that a commercial breeding herd of 3,000 sows would produce the 60,000 animals per annum which pass through market processes. Allowances were made for too close calculation in regard to both output and consumption, and so a decision was reached to encourage a 4,000-sow breeding herd.

PORK GLUT

From the Daily Gleaner, Jamaica, 9 August, 1969

The two Government Ministers in Agriculture, Mr. Gyles and Mr. McLaren, have recently been telling farmers' meetings all over the country that orders and enquiries for fresh pork and pig products have been received from the Bahamas and from Canada, and that in addition markets for these products exist in the Caribbean Free Trade Association (CARIFTA) countries as well as other places.

The message of these pronouncements is that the future of the pig industry is bright; and in fact as Mr. Gyles openly said at the Denbigh Show on Monday, that even those pig growers having difficulty in disposing of their stocks would do well not to lose heart.

The trouble with what the two Ministers have been saying is that they give unspecified assurances on a specific situation - nobody knows whether the size of the markets discovered, for instance, can cover the surplus production of pigs now actually building up; nor has anybody been told whether the outlets discovered are ready for immediate exploitation or need to be explored.

Meantime, it is a harsh reality that pigs are now being produced substantially in excess of domestic demand, and scores

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Excess consumption of sugar, sweets, and cakes should be prohibited, especially when the child shows any tendency to gain weight excessively.

Physical activity should be promoted. The common pursuit in the winter months of sitting by the fire and TV for long periods, idly chewing crisps, should be discouraged and substituted by a gambol in the snow.

It is necessary that we persuade parents that, although we would not wish their children to be like the old person of Dean who 'dines on one pea and a bean', at least Jack Spratt rather than his wife deserves to be elevated to a position of greater prominence in the nursery.

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something should be done about him, but we can only conclude that the physician is helpless. We recommend that you offer no hope, the family will then change doctors, and you will have one less irritant in your daily life." Not many will agree with this view, but a feeling of futility is often difficult to resist.

To diminish the problem of childhood obesity, prevention is obviously of great importance, before patterns are established in the young child which, as can be seen, are difficult to interrupt.

More research is needed to determine why weaning is begun so early, why mothers are so commonly over-feeding their children by applying the principle that "if a little is good, then more will be better still". In welfare clinics, doctors' surgeries, and school health clinics parents should be educated in the harmful effects of over-feeding, just as vigorously as was done when under-nutrition in this country was successfully combatted. Breast feeding should be encouraged, but if bottle feeds are given instead, the pernicious habit of adding excess carbohydrates in the form of sugar to feeds should be discouraged. Feeding programmes should be individualised, and it should be pointed out that, just as in adults, one baby might require less than the frequently quoted figure of 2-1/2 oz. per lb. of body weight and yet thrive just as well as the child next door, who might require more than this.

often less than 1,000 kilocalories per day. Meals should be spread throughout the day, and the intake not restricted to one or two large meals. Exercise should be emphasised to be an essential aspect of therapy, and they should be encouraged to participate in sport - particularly at first those in which they can participate fully clothed. Children treated with graded exercise and diet at summer camps for fat children in the United States [4] and Czechoslovakia [12] lose weight, and with close supervision thereafter this weight loss is often sustained. As Dr. Mayer emphasises, the approach to the child should not be moralistic, and the old method of blaming the child should be superseded by a more sympathetic one. They must be convinced that they are important to the doctor as individuals rather than as fat children. It is also imperative to convince the whole family - often especially the grandmother - that it is preferable for the child to be slim. This may be particularly difficult when, as is often the case, other members of the family are also obese.

Even with the greatest persistence, some 75 per cent of children in many series become fat again. "The child who blossoms from a fatty to a slim beauty in the 'Saturday Evening Post' is far from typical". Gellis[13] has been led to adopt an extreme negative view: "The fat child manages very successfully to avoid exercise, breaks his diet, and is unaffected by pills. All will agree that

additional "fat space" is present there develops a persisting tendency to gain weight even after losing it successfully. Also, dietary habits at this age are often permanently imprinted: carbohydrates in the form of bread and confectionery are lavishly offered and eagerly taken, and when confronted by the subtle blandishments of sweet-advertising he is a sucker for life. The known toxic effects of these substances on teeth and fat accumulation are carefully glossed over by phrases like "bite-sized pieces" and "a nourishing meal in itself"[11]. Though the consumption of sweets in the United Kingdom averages out at the astronomical figure of 8 oz. per week per person,[14] it is likely that children receive the lion's share.

How to treat established obesity in children remains a vexing problem, and most workers have found the results to be disappointing. Although initial weight loss is usually good, relapse is the rule, and seems to occur whether strict diet or drugs are used alone or in combination. Better results follow initial treatment in hospital in some children, but this is frequently not sustained when the child returns home.

Several aspects of treatment, previously neglected, have been found beneficial. It is now realised that maintenance of the obese state does not require the same caloric intake as does the acquisition of obesity, so diet, if effective, should be strict -

been force-fed in the spirit of the King of Karagwe. Some psychiatrists tell us that the reason for this is that the mother's ambivalent attitude to the child, a mixture of rejection and guilt, is assuaged by feeding - an occupation demanding no emotional involvement with her progeny. Others indicate that some obese children have had vomiting and other gastro-intestinal disturbances in infancy, and find that only by eating, and in so doing, growing fat, do they win their parents' love, thus establishing a pattern that will last them for life. These mechanisms may be important in some children, but one suspects that the inexplicably changed feeding patterns of the last decade are responsible for most cases. We have departed from the apt advice given in *The Birth of Mankind*, published in 1540: "... give the child suck 2 years, and when you will wean them, then not to do it suddenly, but a little and a little,until it be able to eat all manner of meat." Now instead, breast-feeding has given way to artificial feeding with modified cow's milk formulae, complemented at as early as four to six weeks of age with cereals and prepared baby foods. Large quantities of sugar are given both in the milk and in the semi-solid feeds. The belief, previously widely held in paediatric circles, that young infants cannot be overfed has now to be drastically modified, as evidence now indicates that this is the age group in whom overfeeding can readily take place. When all body stores are replete it is likely that more fat cells have to be created, and once this

of the world, for example, Alaska and Tonga. This was also true of Europe, where long ago in song and story obesity always had an association (as Wallace[6] points out) with the positive and happy values of life. "The fat person was the image of the one to be trusted. He was kind, happy, jolly and successful. In the female 2 Standard Deviations above the mean weight was a sign of beauty." As Dryden wrote in *The Maiden Queen*, "I am resolved to grow fat and look young till forty, then slip out of the world with the first wrinkle and the reputation of being five-and-twenty." This is now, however, no longer true in the Western world, where in the United Kingdom alone 40 million pounds are spent per year on slimming foods, and great effort is being expended in this happy era of mini-skirts to achieve a good figure. Yet both here and in the United States the number of fat children seems to be increasing year by year. This is hardly likely to be due to an increasing number of children born with something inherently wrong with their metabolic processes, but undoubtedly reflects changes in the pattern of child rearing.

Forbes' work[10] separates obese children into two groups - one he calls "reactive" occurs later in childhood, where the obesity results from over-eating by the child as a reaction to intense and repeated episodes of emotional stress. The other, termed "developmental", dates from early infancy, and these children appear to have

common misconceptions. The usual belief that fatness once established is due to gluttony is disproved by the fact that food intake is often not raised above normal. This underlines the fact that the gormandising prototype of the title is an oversimplified version of the truth, unfair to many obese people. Another finding is that hormonal function controlling energy production, sexual development, and growth is often enhanced. What is established is that fat people exercise less and move more slowly. Obese patients were found to do fourteen, and non-obese thirty-four, miles per week, so that in effect they are under-expending energy relative to intake.[9]

The factor of critical importance in the initiation of obesity seems to be the attitude of society to fatness. In many parts of the world obesity is regarded as highly desirable and even beautiful. The African explorer Speke, in the nineteenth century, came upon the harem of the King of Karagwe whose "wives were so fat that they could not stand upright, and instead, grovelled like seals on the floors of their huts. Their diet was an uninterrupted flow of milk that was sucked from a gourd through a straw, and, if the young girls resisted this treatment, they were force-fed like to the pate de foie gras ducks of Strasbourg. A man stood over them with a whip." Less exaggerated appreciation of fatness is still to be found not only in that Continent but also in other parts

more difficult question, "Why are some children fat?" The glib explanation that "people are fat because they eat too much" is as enlightening as saying that "people are alcoholic because they drink too much". Likewise, a cryptic diagnosis, such as "Its's your glands", is just as valueless.

It is undoubtedly true that fat children show many differences in their metabolic and psychological behaviour from non-obese children, but it is exceedingly difficult to decide whether these factors represent cause or effect. For example, the emotional aspects of being fat, already referred to, are more likely to be a consequence rather than a cause of the obesity. Also, though a number of hormonal alterations are present in fat people, none has been substantiated as the main cause of excessive fatness, and most, if not all, return to normal when satisfactory weight reduction has been achieved. It must be admitted, though, that many of these alterations serve to potentiate the state of being fat, and are themselves part of a vicious circle ensuring that obesity will persist, and even become more marked. Other such potentiating factors are the reduced taste discrimination[7] and the diminished food dislikes[8] found in obesity. Some of the difficulty of separating cause and effect is shown by the observations that fat people use less of their intake to protect themselves against cold. This is probably largely because of the effective insulation their subcutaneous fat provides, and not because they are unable to use their body's fuel. Recent findings contrast strongly with

somnolent, and having difficulty with breathing. Much more usual, however, are flat feet, knock-knees, a proneness to bronchitis in winter, and, in particular, psychological difficulties. These latter are often potentiated by teasing, and by difficulty in participating in the activities of his peers, which increase his feelings of inadequacy and make him less ready to experience social contact. When he then indulges in the solitary pursuits he finds solace in - eating and immobility - the vicious circle snaps shut. There is evidence that when faced by a fat candidate selection boards may pass him over in favour of one more slender. As you might expect, this applies particularly to girls, as shown by a report from America, when the success rate of applicants from high school for college places were investigated.[5]

To quote Wallace [6]: "The pediatrician who would begin the study of obesity today, could well start with a study of Piggy in 'Lord of the Flies'. Either by intent or intuition, Golding has made him physically inept, myopic, frightened, and carried to an early and violent death, his wisdom and foresight unheeded. In Piggy one finds epitomised the contemporary actuarial, psychiatric and medical views concerning the biological cost of excessive fat accumulation."

Having possibly convinced you that it is undesirable for children to be fat, I would like to attempt to answer the rather

who weighed 52 stone 11 lb. After exhibiting himself in London he died in 1809 at the age of thirty-nine. His coffin was lowered into the ground on a ramp. More important is the fact that life expectancy of the ordinary fat man in the street is shortened - for example, a man who at forty-five weighs 25 lb. above standard weight reduces his life expectancy by 25 per cent, i.e. he is likely to die at sixty instead of eighty. This shortened life-span is largely due to the effect of strain produced by over-weight on the heart, combined with high blood pressure and changes in arteries consequent on obesity.

Additional disabilities suffered by the obese are arthritis, spinal disorders, varicose veins, and hernia, and they are also prone to bronchitis, diabetes, gall-stones, gout, and skin infection under folds of fat. Fat people tend to be more prone to accidents, presumably because they cannot lumber out of the way quickly enough. On the other hand, one has the impression that they get themselves less frequently into dangerous situations. Fat people are reputed to be good-natured - perhaps because they cannot fight or run.

In addition to this gloomy catalogue of disorders awaiting the fat child in adulthood, he suffers disadvantages in childhood as well. The most extreme of these, fortunately very rare, known as the Pickwickian syndrome, one may find in the most severely obese, where the child looks much like the one Dickens described - gargantuan,

One group of children should be excluded from the definition of obesity: they are those who at puberty put on weight as a manifestation of the hormonal changes taking place at this time. Adolescence is a sufficiently difficult time of life without the introspection and self-criticism occurring then made worse by calling attention to a temporary increase in body fat. These are the only children to whom the innocent euphemism "puppy fat" could justifiably be applied, and most do indeed "grow out of it". Too much emphasis should not be given to weight reduction, then, as one may encounter susceptible children who virtually starve themselves in an attempt to restore their vital statistics to what they imagine to be ideal proportions.

Too few doctors and dietitians realise that children whose obesity deserves most concern are those who are fat early on - most usually in the first year or two of life.

A categorical "Yes"! can be answered to the question, "Does it matter whether children are fat or not?" It has been shown that 80 per cent of fat children grow up to be fat adults.[2] Looked at in another way, one-third to one-half of obese adults were noted to have been fat as children.[3, 4] The hazards to health of obesity are personified by the short life-span of circus fat men: a chair of astronomical size at the Medical Society of London once seated Daniel Lambert, keeper of Leicester jail in the eighteenth century,

To define which children are fat is, in fact, more difficult than it would seem. Mayer's[1] definition of it as "a child who is too fat for his or her own good", though true, is not very helpful. Some doctors have come to rely on a practised eye sometimes complemented by a gentle pinch to categorise someone as fat, but this is clearly not sufficiently accurate. It should be realised that being overweight is not necessarily the same as being obese. The latter implies an increase in total body fat above the 10 - 20 per cent of body weight that this normally comprises, while being overweight, though most commonly due to obesity, merely indicates that the individual weighs more than he should for his height and age. None the less, many doctors diagnose obesity, usually correctly, by using tables of weight for height and age, and accepting that if the individual weighs 15-25 per cent more (or 2 Standard Deviations above the mean) than he should do at this age he is overweight.

A more accurate measurement of obesity itself is an assessment of the thickness of fat in the subcutaneous tissue - usually done by skinfold measurement in a prescribed area, commonly the upper arm. This has been found to correlate well with more sophisticated methods used in research - such as estimation of body density by underwater weighing or measurement of total body water with radioactive deuterium or potassium. Skinfold measurement is coming into more frequent use, especially in clinics dealing with obese people.

OUR BILLY BUNTER BABES*

by

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In the context of the world problem of undernutrition, it might seem flippant to concern oneself with children who are fat. Photographs of emaciated children staring wanly at us prick our consciences daily, and quite properly we are not allowed to forget the millions starving in the world around us. Perusal of insurance life tables, however, should convince us that the health problems associated with living in an overdeveloped country are also worthy of attention.

One of the most disturbing effects of a life of plenty is the occurrence of obesity, and in relation to this problem in children I would like to ask, and occasionally to answer, the following questions:

Who are fat children?
Does it matter whether children are fat?
Why do some children become fat?
How should these children be treated?

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* *Quoted with permission from "Getting the most out of Food", sponsored by Van den Berghs Ltd., London.*
Editorial Note - This is included because of the possibly increasing incidence of obesity in some parts of the Caribbean. For the younger reader, Billy Bunter was an almost real fat boy in the school-boy magazines of the twenties and thirties).

have hitherto followed - namely, to fluoridate only when all local authorities in the area have asked for it.

The Department is asking local authorities to spend money on a project that should save Health Service resources or at least release them for other things. Birmingham can fluoridate at 3d. a head, but smaller water authorities would have to spend more than this; however, a national scheme would probably not cost more than 2 million pounds or so. Considering children alone, the potential saving in treatment (Health Service, schools service, and private) and in suffering caused by untreated caries is very large indeed. An offer from the Department of Health and Social Security to repay part of the cost (perhaps to those authorities where the local water undertaking is so small that fluoridation costs per head would be well above the national average) seems worth considering at least. Such a step might help persuade the waverers. If the Department can recognise a bargain when it sees one, so too should the Treasury.

(Editor's Comment - The D.M.F. (decayed-missing-filled) index is notoriously very high in the Caribbean, although more usually D.M., as relatively few services exist for filling teeth. Various approaches are all underway in some countries, including fluoridation and the training of dental auxiliaries. The extracts quoted above are all from the Lancet of July 1969, and seem relevant to our circumstances.)

part of Anglesey) than in control areas (Sutton and the rest of Anglesey). The Scottish trial ended when Kilmarnock Burgh Council abandoned fluoridation after six and a half years. This provided an unexpected opportunity to examine caries-rates. In 1961 and 1963 children in Kilmarnock who were aged three, four, or five had been on fluoridated water all their lives. They had strikingly better teeth than either Kilmarnock children of the same age in 1956 (before fluoridation) or contemporaries in Ayr, the control area. By 1968, children in this age-group had never been exposed to fluoridated water, and their teeth were in much the same state as those of children in Ayr. Similar, though less striking, patterns were found for older children and for permanent teeth; in these groups exposure to fluoride had not been life-long. Experience in the U.K. and longer experience in North America has not so far produced any evidence of harmful effects of fluoride at the recommended concentration.

Mr. Crossman expressed reluctance to legislate against what he saw as a minority with sincerely held views, but if the battle between the councillors and the pure-water lobby (which must surely now be renewed) fails to produce a victory for those who are convinced that fluoridation is an advance which can relieve suffering and save money, then it is difficult to see what options are open. The Metropolitan Water Board is shortly to discuss fluoridation again, but it is unlikely to depart from the policy which water authorities

social-class differences in the use of comforters were found, but the sleeping place, the mother's age and the number of children in the family affected these practices. The widespread use of comforters in a manner potentially harmful to the teeth indicates that prevention of rampant caries from this cause can only be achieved if timely advice is given to all mothers.

Fluorides and Teeth

Introducing the second report of the Committee on Research into Fluoridation last week, Mr. Richard Crossman gave the latest figures for local authorities in the United Kingdom deciding for or against the addition of fluoride to their water-supplies. 18 already fluoridate; 2 have natural fluoride levels of at least 1 p.p.m.; and 92 have voted in favour of the scheme but either have not yet implemented their plans or have had them in effect blocked by one or more of the 80 authorities which have voted against fluoridation. Thus, seven years after the earlier report had concluded that "raising the fluoride content of drinking water to a level of 1 p.p.m. is safe" and that there were no technical difficulties, only 2-1/4 million people in Britain drink fluoridated water. For a public-health measure with so strong a case to back it, this is indeed slow progress.

The eleven-year controlled trials revealed substantially fewer decayed, missing, or filled teeth among children in areas where fluoride had been added to the local water-supply (Watford and

sumption of sugar-containing confectionery between meals was significantly related to the incidence of dental caries. Direct confirmation is now available from observations by Fanning in Australia. They have shown a statistically significant excess of tooth decay over two years in children attending schools which permitted the sale of sweets in canteens. 2468 children in secondary schools were investigated, and controls were available from three schools whose canteens did not sell sweets. This evidence reinforces the view that educational establishments should do more to discourage sweet-eating. Legislation to prohibit the sale of sweets on school premises is unlikely to win support, but perhaps tuck-shops could be persuaded to sell foods that do not harm the teeth, such as fruit, nuts, and potato crisps. How to persuade the children to buy them in preference to humbugs and toffee is another matter.

Use of Dummies, Reservoir Feeders, and Comforters in a Child Population in North London - Hilary M. Hart

Dummies, reservoir feeders, and comforter bottles filled with sweetened liquids have been implicated in the aetiology of rampant caries. 149 mothers were interviewed in nine child-welfare clinics in North London to determine the prevalance of these comforting practices. Two-thirds of the children were given a dummy or reservoir feeder at some time during the first year and a quarter had a comforter filled with sweetened fluid at the age of one year. No

wellbeing of mankind in the 21st century depends on our ability in the remaining years of the 20th to teach people in all parts of the world how to grow enough food for a population which will be limited by the forethought of educated parents.

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1. Food and Agriculture Organisation of the United Nations: The State of Food and Agriculture 1968. Rome: F.A.O. pp.205. Obtainable from H.M. Stationery Office, P.O. Box 569, London S.E.1, 46s.

2. Lancet, 1967, ii, 1030; ibid. 1966, ii, 952; ibid. 1965, ii, 890.

3. The Rockefeller Foundation. The President's Annual Report, 1967.

4. Look, March 19, 1968.

D. M. F.: CAVITIES AND GAPS

Sweets at School

The advent of the tuck-shop as a feature or appendage of many local-authority schools in Britain over the past two decades has caused anxiety to those who care for children's dental health. This concern was based mainly on indirect information that the con-

education, mothercraft, nutrition, and home economics. The applied nutrition programmes which are organised by F.A.O. are a small start in this direction.

It is very important that prices of food crops should be kept high enough to provide a financial incentive to farmers. An F.A.O. table shows that this is not usually achieved, even in rich countries. Thus, in the U.K. where in 1955-65 food production increased by 44% (a rate of growth attained by few other of our major industries), prices received by farmers, when corrected for cost-of-living index, are down by 13%. Farmers in Australia, Ireland, and New Zealand are also getting less for their products than formerly. In all countries of the world, rich and poor alike, agriculture must be treated as an industry in which skills and initiatives should be rewarded with wages and incomes comparable to those obtainable in other industries. Without such incentives, food production is unlikely to keep up with the growth of population.

No doubt can now remain that increased agricultural production could meet the needs of a much greater population than exists in the world today. But the new hope in agriculture must not divert attention from the problem of population. In the president's report of the Rockefeller Foundation Problems of Population come before Toward the Conquest of hunger, but we need not argue about precedence. The

because of contamination by fungi and insects or consumption by rodents. This waste can be greatly reduced by the construction of suitable granaries and by the use of chemicals.

In 1967 the F.A.O. estimate of the increase in agricultural production in the developing countries was 6% - well above the estimate for the growth of population. Here lies the ground for the hope that widespread malnutrition can be prevented. Achievement can come only through the enthusiastic cooperation of peasant farmers, who are extremely conservative and reluctant to spend money, which usually has to be borrowed, on new methods of crop husbandry. Hence the immense importance of agricultural education. The Rockefeller Foundation report that Philippine farmers, using IR8 rice and with an investment of $200 per hectare on labour and chemicals, can get net profits of $250 per hectare at harvest four months later. It is comparatively easy to demonstrate that money invested in a crop can bring in a handsome dividend in a single season, but the farmer is unlikely to make the investment until he has first seen the results with his own eyes. Hence the enormous importance of agricultural development programmes and training colleges, so that new attitudes and desires can be created and the skills in the use of new resources can be taught. In rural communities, an agricultural education programme can be organised as part of a general education programme, which includes teaching in health

Tanjore rice-growing district in South India, the rice harvest was increased by 450,000 tons as a result of the use of improved seeds. There are also new high-yielding strains of maize, sorghum, and potatoes, which promise to be particularly valuable in Latin America.

Some idea of the gaps which can be filled by improved methods of agriculture is conveyed by average national yields of cereals, given in quintals per hectare by F.A.O. for the period 1963-67. Yields for wheat include Iraq 4.6, South Africa 7.0, Pakistan 8.1, India 8.3, Kenya 11.4, Australia 12.0, U.S.A. 17.4, United Arab Republic 26.8, U.K. 40.5, Netherlands 44.4; and for rice, Puerto Rico 6.8, India and Pakistan 15.3, Thailand 16.3, Hong Kong 18.3, Ceylon 19.3, Malaysia 25.8, U.S.A. 47.6, Italy 48.9, and Japan 51.8. The gaps between top and bottom of these leagues can certainly be closed to a large extent by the use of the new seeds, provided that improved methods of farming are introduced. If the new seeds are to produce their best yields, the land must be kept in good order, weeds controlled, and the crop kept free of disease; hence the use of fertilisers, herbicides, pesticides, and fungicides must be greatly increased. Whereas in Western Europe commercial fertilisers were used on arable land at an average annual rate of 134 kg. per hectare in 1966-67, the corresponding figure for developing countries is 9 kg. per hectare. Losses of the crop on storage may be large, up to 25% in some circumstances,

most developing countries where malnutrition is widespread the food-supply was barely keeping pace with the population. In 1965 and 1966 there were poor harvests in many parts of the world, notably India and Pakistan; disastrous famines would have followed but for relief from the large stocks of wheat in the U.S.A. These stocks amounted to 38.4 million tons in 1961, but were reduced to 11.6 million in 1967. Not only were the harvest conditions in general good in 1967, but for the first time a significant proportion of crops were raised from improved seeds of high-yielding strains of cereals. These strains have been developed at the International Maize and Wheat Improvement Center in Mexico and at the International Rice Research Center in the Philippines, which are each supported largely by the Rockefeller[3] and Ford Foundations.[4] Dwarf varieties of wheat, Sonora 64 and Lerma Rojo 64, commonly yield 4 tons per hectare and sometimes 5 - 8 tons, in conditions where the usual yield with standard varieties is 1.2-3 tons. Similar increases in yields are obtained by the use of IR8 strain of rice. In 1966-67 some 500,000 hectares in Pakistan and 800,000 hectares in India were sown with Sonora 64 and Lerma Rojo 64 wheat. Turkey acquired 22,400 tons of seed; and other countries, including Afghanistan, Iran, Iraq, Kenya, Lebanon, Libya, Morocco, Rhodesia, South Africa and Tunisia, are beginning to use these strains. The new rice has been widely used in the Philippines and in India. Thus, in the great

industry.

Every category of food in the modern British diet, by being "processed", "handled", "prepacked", "preserved", "sophisticated" or "improved" presents a technological problem of its own. Transport and storage technology is constantly adapting to the need to provide the variety and quality of food demanded by civilised communities. As higher proportions of the total food consumed are provided by catering services or otherwise "eaten out", and greater quantities of processed foods are used, the caterer and food technician are landed with greater responsibility for the nutritional standards, and so health and well being, of the nation.

HOPE FOR AN UNDERNOURISHED WORLD
From the Lancet, October 19, 1968

Hope is the keynote of this year's annual review by the Food and Agriculture Organisation of the United Nations - a sharp contrast to the forebodings of disasters presented in previous reports.[2] In most parts of the world the population has been increasing at a rate of about 2.5% annually. During the decade 1955-65 the growth of agriculture was little greater, and in

food is distributed in the household, who gets the largest share, is protein for example reserved for the male members, how much does the mother get?

These matters are as relevant to nutrition education as knowledge of the various food groups. Like other aspects of health education, developments overseas,where relatively primitive social conditions have made health education imperative, have also been imported to this country and to western Europe. The sociologist and the behavioural scientist are as important in nutrition education in this country, as in the developing countries. It is recognised all over the world that attitudes to food share with attitudes to sex and to excretion the key to health attitudes generally.

It is inescapable, however, that nutrition education has developed in a fragmentary fashion and tends still to be dominated by the traditional domestic scene. The advent of food technology, so much deplored by some, has nevertheless ensured that industrial nations can be adequately fed, irrespective of seasons, weather, or the vagaries of crops. Food technology has also introduced a greater variety to help to avoid the monotonous diets which must be the enemy of sound nutrition. It has always been assumed that the catering industry itself is not a primary target of nutrition education, although of course it has been a primary target of education in food hygiene. Sophistication is now changing the picture in the catering

GENERAL NUTRITION NEWS AND OPINION

NUTRITION EDUCATION FOR THE CATERING INDUSTRY
From The Health Education Journal, March 1969, Vol. XXVIII, p.1 & 63.

Nutrition education is one of the basic subjects in the health education field. Its importance to the health of the school child and to the future of the nation was recognised as long ago as 1904 by the Inter-Departmental Committee of Physical Deterioration. In the remarkable blue-print for 20th century public health produced by that body, a recommendation was made that domestic science should be taught in schools, to boys as well as to girls, and this included information on food values. There is no doubt that early nutrition education had a distinctly "domestic" look, and was aimed at helping less affluent members of the population to spend their money wisely on food and to make a choice of available foodstuffs which would add up to a balanced diet. In its elementary beginnings there was a concentration on food groups, but in more recent times this has been succeeded by a more sophisticated approach in which sociological and behavioural concepts have played their part. The nutritionist in the developing country, for example, is partly a social anthropoligist, studying the cultural background of the country and its effect upon production, distribution and the use of food in the household. It has been in such countries that practical matters have been observed, such as the way in which

of advising on this question after study of the whole situation.

Finally, something should be said about future prospects. The most remarkable advance of recent years has been the development of dwarf varieties of wheat which, under satisfactory conditions, can give yields which are 2 or 3 times greater than those given by varieties previously cultivated. These dwarf varieties were evolved by the Rockefeller Foundation in Mexico and have been introduced into Turkey, India, Pakistan and other countries. They need an assured water supply, abundant fertilization, and protection against pests and parasites. But even allowing for such requirements, they may transform the food situation in a number of countries within less than a decade, changing the present depressing graph of population and food supply, and giving a breathing space during which measures to check the rate of population growth can be vigorously undertaken. There is already talk of an "agricultural revolution" resulting from this new development. The fact is that *Triticum vulgare* is the most important asset which mankind possesses in the struggle to feed the growing millions. For this reason, the place of wheat in human nutrition is likely to be even more important in the future than in the past.

not simply a matter of correcting dietary deficiency; the problem is complicated by inter-relationships between malnutrition and infection, and the attack must be launched from several different angles. But an essential preventive measure is to make available foods and food preparations rich in protein which can be given to the children at risk during and after the dangerous period of weaning. Certain mixtures based on wheat are useful for this purpose. In the Near East, for example, attention is being given to a product called "Laubina", which is mainly "burgol" or parboiled wheat usually containing some 20 per cent of chick pea flour and 10 per cent of skim milk powder, additions which provide lysine and enhance the ecological value of the wheat proteins. In north Africa a rather similar product called "Super-amine", based on hard wheat rather than burgol, is being successfully promoted by UNICEF. A mixture of wheat noodles and fish flour has been given to children in Peru for similar purposes.

Wheat as such, in a variety of forms, and not necessarily combined with other foods in manufactured preparations, makes a useful supplement to diets deficient in protein and calories, particularly when the staple foods are starchy roots and fruits low in protein. It may be consumed in the form of porridge or gruel, breakfast cereals, bulgor alone, or even bread. The most suitable method of encouraging its consumption by children will depend on local circumstances, and nutritionists have the responsibility

nutritional contribution of enrichment depends on the position of wheat products in the diet. If these provide only a relatively small fraction of total calories, and the rest of the diet is rich and varied, the extra nutrients added will make little difference to the value of the diet as a whole. It is very difficult, in such circumstances, to demonstrate a resulting improvement in health. The nutrient content of the flour can be considerably enhanced by raising the extraction rate to 75 - 80 per cent, and it is possible to produce very acceptable flour at this extraction level. Evidence from many countries could be quoted here. Only a few countries, notably the U.S.A. and the U.K., follow a policy of flour enrichment and the great bulk of flour used for bread making and other purposes throughout the world is not enriched at the present time. Taking into account this fact, and the rapidly expanding consumption of wheat flour, it is difficult to visualise the general adoption of wheat flour enrichment. For one thing, a tremendous increase in the manufacture and supply of certain vitamins would be needed, which might strain the resources of the developing countries. To some nutritionists, the most appealing and feasible policy is encouraging the use of flour with an extraction rate of 75 - 78 per cent.

Wheat in various forms can make a useful contribution to the prevention of protein-calorie malnutrition. Prevention is, of course,

and other nutrients resulting from high degrees of milling made an impressive story. It disconcerted the millers, particularly in England and America. An American cereal chemist wrote: "Too many reports about the nutritional inadequacies of white flour were being published for the milling industry to continue to ignore the health characteristics of its major product."

Modern millers and bakers like low extraction flour; it is easily manufactured and easily manipulated for consumption, and the bran or "offal" removed is valuable food for livestock. They insist on the strong public preference for white flour, an argument which is largely, though not wholly, justified. One result of the conflict between the millers and the bakers on the one hand and the nutritionists on the other was the introduction of the process of cereal enrichment. In effect this involves, with wheat, the production of white flour of about 72 per cent extraction and adding to this flour thiamin and other nutrients to raise its content, in respect of these nutrients, to the same level as that in whole meal flour, or even above this level. Such enrichment was made technically feasible by the large scale manufacture of pure vitamins, following their identification and synthesis in the 1930's.

It is not possible to discuss the voluminous arguments for and against flour enrichment, but a few points may be made. The

range the flour has a brown tinge, due to the retention of parts of the grain other than the white floury endosperm. At rates of 75 and below the flour is white. Clearly high extraction or brown flour is superior in nutritive value to low extraction or white flour; the former contains more protein, thiamin and other nutrients. A priori, nutritionists will tend to favour high extraction flour - brown bread rather than white. But the question is not as simple as that. Since early times there has been a strong preference for white bread made from flour containing a minimum of the bran and other outer layers of the grain. Such flour has enjoyed high social prestige for many centuries. In Ancient Rome coarse brown bread was regarded as food for menials and slaves. It usually contained not only a high proportion of bran, but also meal derived from substances other than wheat. It was called panis sordidus - "sordid bread" - by well-to-do Romans.

In general, once people have become accustomed to white bread they are reluctant to change to brown. They do not pay much attention to those who advocate the latter on grounds of health. In Victorian times there were vigorous campaigns to promote the consumption of brown bread, which on the whole had little effect. The arguments used by its supporters were lacking in concrete scientific evidence. But with the discovery of the vitamins the brown bread enthusiasts were provided with more effective ammunition. The large losses of thiamin

The nutritive value of wheat has been extensively studied. Whole or un-milled wheat compares favourably, in its nutrient content, with other unmilled cereals. It contains on the average about 12 per cent of protein and is a good source of thiamin and other vitamins of the B group. But wheat is not eaten "whole" in a large part of the world; it is milled to varying degrees which are expressed in terms of the *extraction rate*, the extraction rate of a flour being the percentage by weight of that flour obtained from whole wheat after any kind of milling. The following illustrates relationships between the extraction rate and nutrient content.

COMPOSITION OF FLOURS OF DIFFERENT RATE

Extractor Rate (per cent)	Protein	Carbohydrate	Fibre	Thiamine	Niacin
	g. per 100 g.			- mg per 100 g. -	
100 (whole wheat)	12.2	64.1	2.8	0.40	5.7
85	12.1	69.8	0.4	0.30	2.0
80	11.7	70.7	0.2	0.20	1.6
70	11.5	72.0	0.1	0.08	0.8
50	10.0	74.5	trace	0.05	0.7

The white flour manufactured in England and the United States has an extraction rate of about 70. In continental Europe rates are a little higher, usually about 75. In countries where wheat is processed by old-fashioned methods rates range from 80 up to about 95. In this

had two main effects: it enabled flour to be easily and cheaply produced in bulk and in general the flour yielded was of low extraction, consisting almost entirely of endosperm; that is, it was denuded of parts of the grain which are richer than the endosperm in certain important nutrients. The bread eaten in England and other industrialised countries after 1870 or thereabouts was made from white low-extraction flour, with important implications from the standpoint of nutrition.

Within the present century the wheat industry in a large part of the world, from start to finish, i.e. from the selection and sowing of the seed to consumption, has become subject to the decisive influence of modern science and technology. A "technical explosion" in wheat production and processing has taken place. With respect to processing, not only milling techniques have been revolutionised. The industrial baking of flour into bread is equally a carefully regulated and largely mechanised process, with scientific methodology applied throughout. But this is only one side of the picture. Much of the world's wheat crop is still grown and prepared for consumption by methods which have remained largely unchanged over the centuries. These are now giving place, step by step, to modernisation, leading to increased yields and also to the replacement, in a number of countries, of traditional wheat preparations by factory-made white bread.

climatic and cultural conditions and consumer needs, either by carrying seeds of wheat from one part of the world to another, or by the deliberate selection, breeding and propagation of productive and disease -resistant strains with other desirable characteristics. A remarkable fact is the key part played in the recent history of wheat by the evolution of new varieties of the species *Triticum vulgare*. Thousands of new varieties have been produced by selective breeding, based to a large extent on an understanding of Mendelian laws of heredity. Selective breeding has not been applied on the same scale to any other plant food.

There are numerous examples of the striking successes achieved by these methods which have, of course, benefited not only the newer wheat lands in the Western Hemisphere and Oceania, but also those of countries in the Old World where wheat has been grown for many centuries. The result has been a tremendous increase in world wheat production, and great possibilities of further increase.

With respect to wheat processing, a revolutionary invention was made in the middle of the 19th century: the steam-driven "roller" mill. This operates in a different way from the old stone mill, which simply crushes the grain into a meal. To quote a standard text-book: "roller milling is an elaborate, semi-automatic, cheap and efficient way of fractionating wheat into its constituent parts and represents an advance on the cumbrous method of stone-milling." The invention

But then came a lull, continuing through the first 18 centuries of the Christian era. On the agricultural side, there was little advance in soil management, no new varieties were evolved, the grain was sown and reaped by hand, and yields remained low everywhere. Wheat technology was equally stagnant. The invention of the windmill introduced a new source of power, but otherwise little change in the modus operandi and products of milling; the grain was still crushed between the upper and the nether millstone. Professional bakers in the Middle Ages probably failed to maintain the levels of skill reached in Ancient Rome.

In the 18th century there were some improvements in methods of cultivation and in milling, particularly in Europe. But it was in the 19th century that a great transformation occurred, due mainly to three or four new developments. The first of these was the movement of the major centres of production from the Old World to new countries across the oceans, where there were huge areas of grass-land - the prairies and pampas - suitable for the growing of wheat, and energetic settlers ready to make use of them. These areas - in the U.S.A., Canada, the Argentine and Australia - lent themselves to the mechanisation of wheat production. But even more important than mechanisation has been the establishment in wheat-growing areas of varieties of wheat specially adapted to local

evolved for transforming harvested grains into forms suitable for daily consumption, i.e. on food technology in the broadest sense of the term. At first, simple wheat preparations were made and eaten: parched grains, porridge and unleavened flat-cakes baked on hot stones. Then a great discovery was made, probably in Ancient Egypt, namely that wheat, after grinding, could be leavened and baked into porous loaves. Technological developments in milling and baking were essential for the production of this new food - the loaf of bread. The stone mill, the oven and the craft of baking each have their own fascinating evolutionary story.

By the first millenium B.C., the cultivation of wheat and wheat technology - both of course still primitive in comparison with modern achievements - had reached a stage of development which made wheat the most important food in western Asia and the eastern Mediterranean. The Bible is full of references to wheat and bread; in the Lord's prayer "our daily bread" is equated with "food in general". Ancient Rome was dependent for its existence on wheat transported from its granaries in North Africa. If you are visiting Rome, have a look at the fine tomb of the miller-baker Marcus Vergilius Eurysaces, just outside the Porta Maggiore, dated at about 100 A.D. It shows that those who supplied the people of Rome with bread were citizens of great dignity and substance.

hence the birth of astronomy, the earliest of the sciences. The bartering of surplus grain between communities accelerated the growth of language and the invention of symbols for communication which were the origin of writing. "The seeds of wheat", it has been said, "were the seeds of civilization". This is no doubt a picturesque exaggeration, but it contains an element of truth.

The cultivation of wheat developed steadily once the first step had been taken. New agricultural instruments and techniques were evolved. Digging sticks were superseded by wooden ploughs and harrows; the design of sickles was improved and the threshing flail invented. Techniques to foster cultivation, such as irrigation and allowing the land to remain fallow for a season, were devised. Yields of wheat were increased by choosing the best grains of one year as seed for the next. New species appeared, sometimes by the accidental crossing of ancient species with wild grasses. One new species of far-reaching importance was *Triticum vulgare* or bread wheat which accounts for over 80 per cent of the wheat grown today. After establishing itself in west Asia, *Triticum vulgare*, together with other rather similar species, spread eastwards to India and China. The wheat of Ancient Greece and Rome was mostly *Triticum vulgare*.

Wheat is grown to be eaten. Its whole history, and indeed its present position in the world, turn on the methods which have been

some of the features of this kind of wheat as cultivated in later times. It is not certain whether the wheat which has left relics in Jarno was wild or cultivated; possibly both were eaten. But there is a strong assumption that the sowing or domestication of wheat was already beginning in this ancient settlement. Even earlier evidence from other sites in western Asia may be forthcoming. Unquestionably the cultivation of wheat originated 8,000 or more years ago in western Asia, where to this day wild wheat still grows on mountain sides. The same is true of another important cereal, barley.

The domestication of wheat had far-reaching consequences for the human race. It contributed much to the transition of man from a hunter and food gatherer to a farmer. It provided food which could be stored for use throughout the year, and gradually a stable farming economy, which included domestic animals, was evolved. Sections of the community had opportunities for engaging in activities other than the obtaining of food; division of labour and specialisation, and with these the fostering of the arts and crafts, became possible. Agriculture, and also animal husbandry which involved the continuing care and deliberate breeding of livestock, promoted consciousness of time and of the sequence of the seasons; it became necessary to think in terms of the next year's food rather than in terms of the next day's hunting. The planting and reaping of food crops led man to make observations of the movements of the sun, the moon and the stars;

certain questions of special interest and importance. Among these are the advantages and disadvantages of wheat flour of high and low extraction - i.e. in simplified terms of "brown" and "white" bread. Associated with this question is the desirability or otherwise of "enriching" wheat flour with certain nutrients. There are links between wheat and certain diseases, including beriberi and pellagra. Again, wheat products are likely to prove of considerable value in the prevention of protein-calorie malnutrition.

It is significant that FAO chose as its emblem an ear of wheat, surrounded by the letters of its name, with the Latin motto "Fiat Panis" - "Let there be bread" - appearing below. No other food would be equally appropriate as the emblem of an international organization of food and agriculture.

Origins and history

The earliest archaeological evidence as yet discovered of the use of wheat as human food comes from the neolithic site of Jarno in what is now northern Iraq. This site has an estimated radio-carbon date of 6700 B.C. There the carbonised remains of wheat grains, and imprints of grains in baked clay, have been found; these can be identified as belonging to the species of wheat known as wild emmer and wild einkorn, and to a variant of wild emmer with

W H E A T

by
D. R. Aykroyd

[Extract from a lecture delivered at the Course on Community Nutrition]

Wheat belongs to the genus *Triticum*, which is a member of the huge grass family or *Gramineae*. It has been a human food for nearly 10,000 years. It is now the world's most widely cultivated food plant, being eaten in various forms by more than 1000 million human beings. It grows in a diversity of climates and on many different kinds of soil, but not in the hot moist tropics which are pre-eminently suited to rice. It is sown and reaped somewhere in the world in every month of the year, on farms which range in size from small-holdings of a few hectares to the vast mechanized farm in North America and other great wheat-producing areas. Since the beginning of the present century world wheat production has almost doubled, and now exceeds 300 million metric tons annually. The quantities of wheat entering international trade are greater than those of all other cereals put together; over a fifth of the world's crop is exported from the country of origin.

Wheat is eaten in many forms, from the white bread, biscuits and breakfast cereals of the industrially-developed countries to the unleavened chapattis of India, the "volcay" bread of the Arab world, and the noodles of China. A great deal of research has been done on the nutritive value of wheat and wheat products, reflected in a huge amount of literature. Within the area of nutrition, there are

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fail to survive, and why. One can guarantee that such estimates, when compared against death rates in industrialised countries, will contain disagreeable surprises, particularly in regard to the mortality rate in the second year of life.

However, these are minor criticisms. The report as a whole can be warmly recommended and not only for all who are already engaged in trying to meet some of the needs of the young child, educational, health, nutritional, protective; but also for the generalist, e.g. politicians or active members of such voluntary groups as Lions Clubs, Kiwanis, Jaycees, etc. It should also be required reading for every volunteer from outside the area, whether of Peace Corps, or V.S.O., or C.U.S.O.

The book does not indicate any price. Readers who wish to obtain copies are advised to write to UNICEF, Apartado Aereo 75-55, Bogota, Colombia.

* * *

The six recommendations are for: development of food and nutrition policies; inter-ministerial National Nutrition Committees; studies on food consumption and food habits; training activities at all levels in food and nutrition; implementation of applied nutrition programmes; increased parent education in nutrition. One could not quarrel with any of these suggestions, except that applied nutrition programmes as they exist at present seem more likely to contribute in the long run rather than in the short run to meeting the urgent nutritional needs of the pre-school child. By the way, is it true to say, as this book does, that applied nutrition programmes "have proved their ability to reach mothers and children selectively and to improve their nutritional status?" If so, one would like to read an account of this proof.

There are two minor criticisms one would make. In a situation where there are many competing claims on available funds, it should be emphasized that programmes to meet the needs of young children are investments in the improvement of a country's resources and promotion of its economic development, and they should be considered as economic investments and not as non-essential services. Secondly, the prime need of pre-school children, like all other human beings, is to survive. It would be useful to see more of an attempt to estimate the precise extent to which they

and protection; and discussion of the relationship of community development to the pre-school child and of the needs in the area of training and fact-finding and research. It is difficult to single out any particular section, for each has such a bearing on the other that it is better that the report be read as a whole. Emphasis is rightly laid on the need for more day care, of better quality, which could feature better early childhood education and an attempt to improve the health and nutrition of children as well as promote their mental and social development.

The last quarter of the text consists of conclusions and recommendations. The latter are on a practical level. For example those in regard to health call for improvement of environmental hygiene, expanded immunization programmes, more and better preventive and follow-up services in regard to malnutrition and gastro-enteritis, and the development of health programs specifically to enable pre-school children to be kept under continuing medical supervision. This reviewer feels that these are perfectly feasible, and moreover are in line with the policy of most governments. Indeed, in recent months special attempts have been made in Jamaica, Trinidad, Barbados and Guyana to increase immunization coverage.

In nutrition the recommendations are also very much in accord with the policies of governments and international agencies.

BOOK REVIEW

THE NEEDS OF YOUNG CHILDREN IN THE CARIBBEAN

This booklet (83 pages, 54 of main text) is a report on a conference held in November 1967 in Barbados, sponsored jointly by the Government of Barbados and UNICEF. There were participants from almost all islands and territories of the Commonwealth Caribbean, including British Honduras, and also from Surinam.

The editors of this report and the participants deserve high praise. They have produced something, not particularly technical in its language and easy to read, which could be of value to all the many whose work concerns the welfare, physical, mental or social, of children below school age. Much of what they say of special needs, e.g. nutritional, is familiar to the specialist, but the value lies in the way in which the needs are placed in the context of the total needs of the child.

The first few pages, which are a synthesis of reports from eleven countries describing the conditions which affect the pre-school child, make an excellent and succinct introduction to the problems.

The main body of the report is a review of various aspects of the needs of the child; physical development, social and emotional development; needs in respect of health services, food and nutrition, day care, parent-education, legislation, child care

He concludes:

" This would enable the overcoming of red rice problem, as Bluebell is ready to harvest even while the red rice plants are still in vegetative stage'.

A conclusion which, we submit, might have been acted upon before.

SOYBEAN-BANANA MIXTURE DEVELOPED
From 'Cereal Science Today', March 1969.

Bananas and soybeans have been successfully combined by Israeli scientists to create a beverage for infants. Developed through research performed under PL 480 grant awarded by the Agriculture Research Service of USDA, the process dehydrates the mixture to a powder-like substance containing 4-20% soy protein. Mixed with water, the substance makes a beverage with potential for weaning and infant feeding, particularly in milk-deficient countries.

to teach them the methods which should be used for its eradication.

The World Crops editorial drew attention to one aspect of the problem which had escaped attention in Guyana. Investigators in that country had repeatedly stated that all the types of red rice matured about a fortnight before the commercial varieties amongst which they grow. We therefore stated:

> 'If this fact is indeed established beyond doubt and applies to all varieties of red rice in the region, it provides the key to the solution of the problem. All that is necessary is to replace existing varieties by others having a maturation period shorter than that of red rice, thus denying the latter an opportunity to ripen seed. This would result in harvesting the crop before instead of after the red varieties matured. It follows that if this were done for a few years it would result in the complete elimination of red rice'.

Six years after the publication of this editorial the Guyana government obtained the services of Mr. M.S. Pawar, a rice geneticist, under a FAO Technical Assistance Scheme to give advice, guidance, and to work with a team of local officers to produce a variety of paddy suitable to local conditions.

Reporting in the March 1967 number of The International Rice Commission News Letter, an official journal of FAO, Mr. Pawar states that the American rice variety Bluebell matures in 83 days as compared with 150 days required by the leading Guyana variety.

GENERAL NUTRITION NEWS AND OPINION

RED RICE - A PROBLEM THAT NEED NOT BE

From 'World Crops', December 1968

In many parts of the world varieties of rice possessing a red pericarp or seed coat are considered to be one of the most serious weed pests in rice fields. The presence of this wild rice mixed with cultivated varieties necessitates harder milling to remove the red colour and this results in a large quantity of bran and broken grain and a smaller amount of commercial rice.

While there are many types of red rice (one investigator counted 18 clearly distinguished types in one square chain), they all have similar vegetative characters, the most important being that the grain is shed before it is ripe. Consequently, not only is the harvested crop heavily contaminated with this obnoxious red grain, but the land is re-infested to the detriment of subsequent rice crops.

Experimental work has been carried out in many countries to devise means of controlling - if not eliminating - red rice. A World Crops editorial of December 1960 discussed the investigations to discover ways of bringing red rice under control in Guyana which had engaged the attention of the authorities in that country for six years. Although this work resulted in certain recommendations, we considered that the investigations were insufficiently conclusive to warrant a campaign to make farmers more conscious of the weed and

Cumin Seed	- 1/4 tsp.
Lime (juice)	- 1
Salt	- 1/2 tsp.

Method: Cook peas until soft. Add all other vegetables peeled and cut into 1/2" long strips. Add turmeric and cumin seed. Cover and cook for 20 mins., stirring occasionally. Add salt and coconut. Remove from head. Add lime juice and stir. Serve with rice.

CFNI would be pleased to learn of other recipes for the use of grated coconut other than in sweets and cakes.

Sugar - 1 tblsp.

Method:- Grind all ingredients to a smooth paste. Use as sandwich filling. Interesting variations may be obtained either by adding mint to the mixture, or by using along with very thin slices of cucumber.

6. *Pancakes*

Ingredients: Pancake batter

Brown sugar - 1 cup

Coconut grated - 2 cups

lime(juice) - 2

Method: In centre of each pancake, place 2 tblsps. mixture made by mixing the grated coconut and 3/4 cup brown sugar. Roll up. Sprinkle a little lime juice and dip pancake in sugar.

7. *Aviyal*

Ingredients: Green Banana - 2

Breadfruit - 1/2 lb.

Pumpkin - 1/2 lb.

Turnip - 1/4 lb.

Green Peas - 1 pint

Coconut (grated) - 2 cups

Turmeric - 1/4 tsp.

4. *Karanjee (Coconut turnovers)*

Ingredients: Pastry	Wheat flour	- 2 cups
	Vegetable shortening	- 1-1/2 tlbsp.
	Salt	- 1/2 tsp.
Filling	Coconut (grated)	- 2 cups
	Sugar	- 1 cup
	Cardamon powder	- 1/4 tsp.
	Nutmeg powder	- 1/4 tsp.
	Oil for frying	

Method: Mix first three ingredients into a stiff dough. Roll out to 1/4 inch thickness. Cut out circles of 3" diameter. Place 2 tblsps. of filling made by mixing coconut, sugar, cardamon and nutmeg in the centre of each circle, moisten edges and fold pastry over filling into crescents. Press edges with a fork and fry in deep fat until golden brown.

5. *Chutney Sandwich Filling*

Ingredients:-	Grated Coconut	- 1 cup
	Green Pepper	- 2
	Garlic	- 2 cloves
	Salt	- 3/4 tsp.
	Green mango (unripe)	- 1 medium

2. *Coconut Sambal*

Ingredients:- Coconut (grated) - 1
Sweet Peppers - 2 - 3
Chopped onion - 1 tlbsp.
Chopped garlic - 1 tlbsp.
Chopped fresh ginger - 1 tlbsp.
Dried shrimps (Optional)- 1 tlbsp.
Lime (juice) - 1

Method: Grind first six ingredients in blender or other grinder for 2 minutes. Add lime juice, mix thoroughly.

3. *Spinach Mallung*

Ingredients:- Spinach (chopped) - 4 cups
Onions (") - 2 cups
Coconut (grated) - 1 cup
Turmeric - 1/4 tsp.
Salt - 1 tsp.
Vegetable fat - 2 tlbsps.

Method: Fry the onions in fat till pink. Add chopped spinach, turmeric and salt. Stir well, and leave to cook on medium heat for 20 minutes or until most of the liquid has evaporated. Add grated coconut, mix well and serve.

Any vegetable like cabbage, beans, carrot or a combination of these may be used instead of spinach.

particularly for young children. It would seem reasonable, therefore, to encourage the use of the entire kernel of the coconut whenever possible. This would entail no extra effort, process or equipment, since the coconut is normally grated as the initial step in the preparation of coconut milk, which is used extensively.

In the Caribbean at present grated coconut is used only in a few sweet preparations such as coconut toffee, coconut drops, and to a small extent in custards and cakes. In other countries with appreciable supplies of coconut however the grated form figures much more widely in the culinary repertoire. Some of the dishes calling for this item are presented below.

1. *Pittu*

Ingredients:- Wheat flour - 2 cups
Grated coconut - 2-3 cups
Salt - 3/4 tsp.

Method: Roast the flour in a dry pan over medium heat until light brown in colour. Cool. Add salt and coconut, and mix with a circular movement, until entire mixture looks like little grains. If necessary, sprinkle a little cold water while mixing. Place in a covered container and steam for about 40 mins. Serve with coconut sambal.

FOCUS ON COCONUT

by

Dr. S.K. Reddy

In this issue Dr. Usborne of St. Vincent writes indicating that coconut is one of the more easily and plentifully available commodities in the area, and it would seem useful to write an article dealing with its various uses.

In the Caribbean the coconut is most commonly used in the following forms:-

(a) Coconut water - the liquid contents of the immature coconut.

(b) Coconut cream or milk - the milky extract from kernel of the fresh mature coconut.

(c) Coconut oil - oil extracted from the mature dry kernel of the coconut.

(d) Grated coconut - the grated kernel from fresh mature coconut, and to a small extent from the mature dessicated coconut.

While the first three forms are most popular, it appears that the grated coconut form could be used much more extensively, especially in view of the relatively greater protein content as compared with the others.

It might be pointed out that the residue left after extraction of oil from the coconut is appreciably rich in protein (23-29%). Research is underway as to possible methods of processing and utilising this source of protein for human consumption,

in banana-growing islands.

(4) What dietary correctives would you recommend for very poor anaemic patients? I recommend callalloo, watercress and local cocoa, with citrus fruits, and also meat if and when available. What is your opinion about this?

I find 'Cajanus' very interesting indeed. Congratulations.

Yours sincerely,

V.M. Usborne

Editor: We answered Dr. Usborne's question about the banana flower in Cajanus #9, in the 'Your Questions Answered' feature. We answer the question about dietary advice for anaemic patients in this issue in the same section. In response to Dr. Usborne's suggestions about the uses of bananas and coconuts an article with recipes appears in this issue, "Focus on Coconut", and there will be an article in Cajanus II (October) on the uses of banana.

We are very grateful to Dr. Usborne for her suggestions. We are always delighted to receive such ideas and questions from our readers.

be so, since so many professional people in contact with malnourished children share these views), yet this would not be an occasion to "go into battle" with the producers, advertisers and agents, but rather to show them the facts and then seek to enlist their aid in the production and marketing of foods much more suitable to the needs of the area.

From Dr. V.M. Usborne, Grand Sable Estate, St. Vincent

Dear Sir,

I would like to suggest the following topics and questions for 'Cajanus'.

(1) An article entirely devoted to the nutritional uses of the banana, because "reject" bananas are often available free or for sale at very cheap prices in banana-growing islands.

(2) Likewise an article on the uses of coconuts

(3) Do you know a way of using the banana "flower" (or terminal bract)? I understand that it is eaten in the East, but I cannot find out how it should be prepared. The "petals" are too bitter (?) but the "flowers" lying inside in rows seem quite pleasantly edible after soaking and cooking. What nutritional value would they have? Naturally these too are freely available

I look forward to seeing an answer to these questions in the next issue of "Cajanus"

Yours faithfully

Dorothea McKendrick

Editor: The answer to the first question is "No"; and the answer to the second is "Yes", at some future time if it seems necessary, and on a Caribbean-wide basis.

There are two considerations which are uppermost in our minds in respect of proprietary infant foods:

(a) before making strong public pronouncements about this matter it is very important to have gained a solid body of up-to-date factual knowledge about the consumption, preparation, attitudes towards, cost and nutrient value of these foods. This is one of the reasons why the Infant Feeding Working Party was organized by CFNI in December last year, and CFNI is attempting to coordinate and assist investigations this year on these topics throughout the Caribbean, which, with research already carried out by CFNI and others, should provide us with the necessary background information. CFNI has also sent some proprietary foods, on which no food composition information is published, to FAO for nutrient analysis.

(b) If the impression we have about these infant foods and the ambivalent role they play, is confirmed, (and it could well

READERS' LETTERS

From Mrs. D. McKendrick, 75 Palmetto Avenue, Kingston 6, Jamaica

Dear Sir,

Congratulations on your question and answer on the subject of advertising of infant foods which you say can be a harmful practice. I agree entirely and I am sure that many others share your views.

You speak of the necessity for consumer education among all groups and the role doctors and nurses can and should play but at no time do you refer to what you consider the role of the advertiser.

We know that the job of the advertiser is to advertise a product in such a way that the consumer will want to buy it, but shouldn't good advertising inform rather than merely promote, and wouldn't it be true to say that much of our advertising in Jamaica misleads rather than enlightens.

And here we come to the questions I would like to ask.

1. Do you believe that the advertisers and the agents for many of these infant foods are fully aware of the damage they are doing and how many infants particularly in the low income group are the victims of advertising?

2. Has your organization ever or does it contemplate taking up this matter with the Advertising Association of Jamaica at any time?

Social background factors	3 to 6 months				9 to 12 months				15 to 18 months			
	Above 90th percentile		Below 10th percentile		Above 90th percentile		Below 10th percentile		Above 90th percentile		Below 10th percentile	
NUMBER	22		22		24		22		24		21	
Maternal factors												
(1) Maternal age (mean & range)	28.2yr.	(14-44)	23.9yr.	(16-36)	27.3yr.	(14-40)	23.6yr.	(14-33)	27.5yr.	(16-40)	27.6yr	(17-39
(2) Proportion married (no & %)	10	(45%)	5	(23%)	11	(46%)	7	(32%)	9	(38%)	6	(29%)
(3) Birth rank of child (mean & range)	5.4	(1-12)	3.9	(1-11)	4.8	(1-11)	3.8	(1 -10)	4.5	(1-11)	4.8	(1-13)
(4) Further pregnancy started before end of quarter	1	(5%)	2	(9%)	3	(13%)	7	(32%)	9	(38%)	10	(48%)
(5) Interval between this and preceding infant (if any) (mean & range)	25.4mo.	(10-68)	19.4mo.	(12-28)	27.6mo.	(12-92)	26.0mo.	(12-68)	24.8mo.	(12-46)	30.3mo	(12-104)
(6) Reached VI grade primary school	10	(45%)	8	(37%)	12	(50%)	10	(45%)	14	(58%)	9	(43%)
Social factors												
(1) Extreme poverty	3	(14%)	9	(41%)	3	(13%)	9	(41%)	6	(25%)	6	(29%)
(2) Good social integration	3	(14%)	3	(14%)	11	(46%)	5	(22%)	8	(33%)	6	(29%)
Housing & land												
(1) Overcrowding- persons/room (mean & range)	3.8	(1.3-8.0)	4.9	(2.0-13.0)	3.2	(1.4-8.0)	3.9	(1.3-13.0)	4.0	(1.0-10.0)	4.0	(1.8-8.0)
persons/bed (mean & range)	3.4	(1.3-5.5)	3.8	(1.7- 8.0)	3.1	(2.0-5.0)	3.6	(1.4- 6.5)	3.4	(1.5- 6.0)	3.3	(1.0-5.0)
(2) Good house repair	14	(64%)	11	(50%)	16	(67%)	8	(36%)	15	(63%)	14	(58%)
(3) Acreage - owned (mean & range)	3.2	(0-7)	3.9	(0-16)	3.3	(1/2-6-1/2)	3.0	(0-20)	2.4	(0 - 5)	2.9	(0-10)
cultivated (mean & range)	2.6	(0-7)	2.7	(0-11)	2.5	(1/2-5)	2.3	(0-10)	2.1	(0 - 5)	2.3	(0-10)

TABLE 2: Social background factors in Jamaican infants with good weight gains (above the 90th percentile) and poor weight gains (below the 10th percentile) during the quarters 3-6, 9-12 & 15-18 months.

Quarter (months)	MALES					FEMALES				
	No.	Mean	S.D.	10th percentile	90th percentile	No.	Mean	S.D.	10th percentile	90th percertile
0 - 3	73	5.4	1.7	3.5	7.2	63	4.8	1.6	2.8	6.6
3 - 6	101	3.4	1.1	2.2	4.9	98	3.4	1.1	2.3	4.6
6 - 9	106	2.2	0.9	0.9	3.5	103	2.2	0.9	1.2	3.2
9 -12	99	1.6	0.8	0.6	2.6	102	1.5	0.8	0.5	2.5
12 -15	100	1.2	0.7	0.3	2.1	98	1.4	0.7	0.5	2.2
15 -18	94	1.2	0.9	0.1	2.2	99	1.4	0.9	0.2	2.4
18 -21	93	1.1	0.9	0.1	2.3	98	1.3	1.0	-0.1	2.3
21 -24	88	1.0	1.0	0.2	2.2.	88	1.1	0.8	0.0	2.2

TABLE 1: Mean quarterly weight increments (lb.) from birth to two years of age with 10th and 90th percentile values - Lawrence Tavern, Jamaica.

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Footnote: Reprinted by kind permission from '*Maternal and Child Care*' August, 1968, vol. 4, p.161. '*Maternal & Child Care*' is published monthly by Bouverie Publishing Company, 2 Salisbury Court, London E.C. 4.

The findings confirm the influence of factors associated with poverty and rapid reproduction and suggest that unstable parental relationships may be a major cause of infant malnutrition in Jamaica.

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We gratefully acknowledge the contribution made by Mrs. Catherine Heron, and her team of assistants who undertook the arduous field work in this study and helped in its analysis. We also thank the mothers in Lawrence Tavern who collaborated so well in such a prolonged investigation. This study is partly supported by a grant from the Association for the Aid of Crippled Children, New York.

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from gastro-enteritis and broncho-pneumonia, are no longer a hazard.

The analysis reported here emphasises the importance of poverty, but poverty per se is rarely a cause of gross malnutrition in Jamaica. Poverty leading to inadequate care - sometimes as a direct result of economic pressures - and poverty associated with lack of knowledge and inappropriate and often-delayed treatment of disease, undoubtedly play a major role.

The lack of father's support is clearly another important social factor contributing to undernutrition in general - and to infant malnutrition in particular.

SUMMARY

A study is described in which anthropometric measurements were made on a cohort of infants born in a rural area in Jamaica, and repeated at frequent intervals since birth. Growth, by the standards of infants in industrial countries, is much retarded from three months of age till about two years of age; by eighteen months of age less than 20 per cent of children have attained their expected weight for age, or their expected weight for height.

Comparisons were made of the social backgrounds of children whose quarterly weight increments were above the 90th and below the 10th percentiles.

first three months is satisfactory, but from that age the weight increments are smaller than for infants in more developed countries and approach them again only when the child reaches about 18 months of age. Thereafter, growth curves of Jamaican and other West Indian children run parallel with, but well below, current growth curves in Britain or the U.S. until puberty [4,5].

It is, of course, particularly during this critical post weaning period that mortality is high and has responded less to the improvements in public health which are benefiting younger and older children [6]. Of the three interrelated influences - diet, disease and social background - only the latter has been considered in this analysis. The interaction between these three influences is little understood.

Several longitudinal studies have now been in progress in different parts of the world [7,8,9,10] and these may increase understanding of the many influences which can cause faltering in growth in a young child.

In Gambia, for example, the seasonal but overwhelming influence of disease has been emphasised [9]. In Jamaica seasonal influences and acute diseases appear to play a minor role in a condition which, as seen in the 229 individual growth curves in this series, is one of chronic and insidious undernutrition. With few exceptions growth is steady but slow. Major infections, apart

The assessment of attitudes, and the quality of child care cannot be readily measured objectively. The public health nurse, herself a Jamaican who knew these families well, was asked to put the mothers and guardians into three groups according to her assessment of their concern for the welfare of their child. One hundred and sixty-three of the 227 were considered reliable, interested and responsible women who would do their best for the children - though their efforts might frequently be limited by poverty and sometimes by lack of knowledge. Thirty seven were considered to be not very deeply concerned about their child's welfare. Twenty-seven were in an intermediate group.

The proportion of infants whose weight increments, in the three quarterly intervals, were below the 10th percentiles were: 4.9 per cent, 7.4 per cent and 9.2 per cent in the responsible group; 24.3 per cent, 21.6 per cent and 10.8 per cent in the less responsible group. Thirteen of the 37 mothers who gave the impression that they were not very concerned for their child's welfare were amongst the parents of the group of 25 children in very unstable homes.

DISCUSSION

The data illustrated in **Figures 1 and 2** show the features of child growth which are found in many pre-industrial communities. In Jamaica as elsewhere in the Caribbean [3], growth within the

of the total farming population. More crops grown in one year mean more direct annual income, therefore.

Living on 1ha

Smallholders can make a decent living on 1 ha of paddy field when they work hard in such a favourable environment as is prevailing in Taiwan apparently.

Table 1
The growing seasons of summer and winter cash crops in the quadruple cropping system

Crop	Date of planting (or trans-planting)	Approx. period for both rice & cash crop occupying the field (days)	Approx. period for cash crop alone occupying the field (days)	Total crop season (days)	Date of harvesting
A.Summer cash crop:					
Jute or soybean	Mid-May	20	60	80	Early Aug.
Oriental pickling melon	Mid-May	15	60	75	Early Aug.
Japanese Cantaloup	Mid-May	15	60	75	Early Aug.
Sesbania sp.(green manure)	Early May	30	50	80	Late July
Native Cabbage	Mid-June	-	45	45	Late July
B.Winter cash crop:					
Wheat	Late Oct.	13	102	115	Mid-Feb.
Sweet potato	Mid-Oct.	28	102	130	Mid-Feb.
Maize	Late Oct.	8	102	110	Mid-Feb.
Soybean	Late Oct.	13	102	115	Mid-Feb.
Tobacco	Late Oct.	18	102	120	Mid-Feb.
Field Pea	Late Oct.	13	102	115	Mid-Feb.
Green Bean (green manure crop)	Early Oct.	30	88	118	Early Feb.
Tomato	Late Oct.	18	102	120	Mid-Feb.
Cauliflower or broccoli	Late Oct.	10	90	100	Early Feb.
Chinese Cabbage or rape seeds	Late Oct.	10	70	80	Mid-Feb.
Flax or barley	Early Nov.	-	100	100	Mid-Feb.
Buckwheat	Mid-Nov.	-	75	75	Late-Jan.

Table 2

QUADRUPLE CROPPING PATTERNS PRACTISED ON PADDY FIELDS IN CENTRAL TAIWAN, CHINA

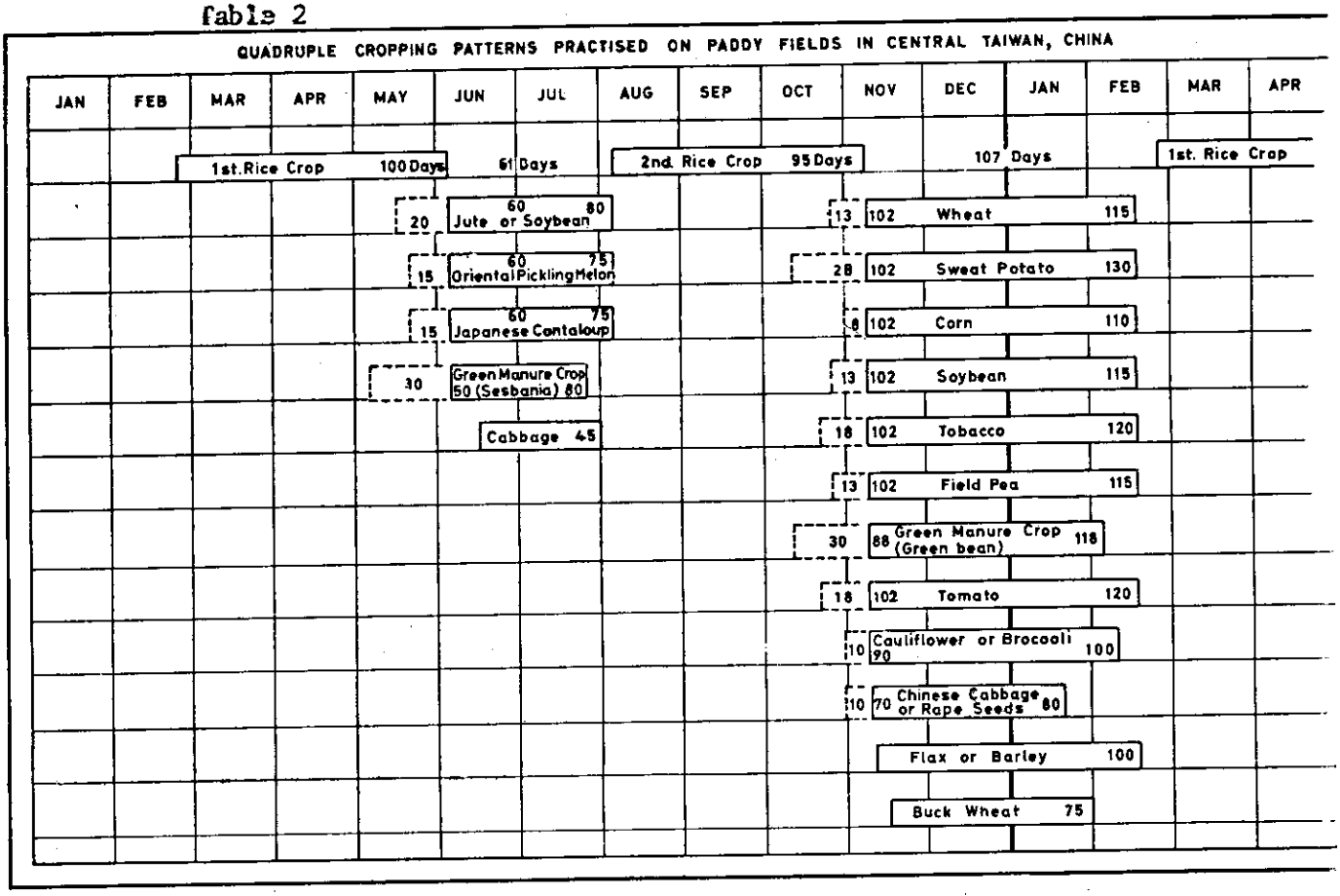
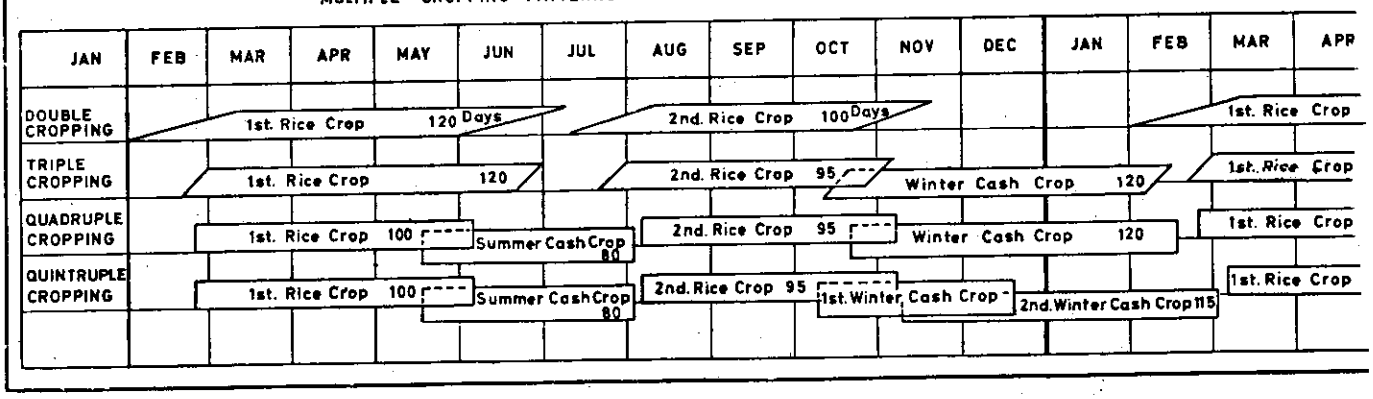


Table 3

MULTIPLE CROPPING PATTERNS PRACTISED ON PADDY FIELDS IN TAIWAN, CHINA



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CFNI NEWS

On 31 October the first Diploma in Community Nutrition course came to an end with the submission of the students' reports on their 3-month field research projects which they carried out in their home countries. The reports cover a wide range of subjects and among them there are some of good quality which are informative and may prove useful to their governments.

An advertisement and a book review appear elsewhere in this issue in respect of the proceedings of the Conference *Protein Foods for the Caribbean*, held in Georgetown, Guyana last year. The five-man mission from FAO and PAHO (see the last issue of 'Cajanus', page 415) who are visiting the area and with the assistance of CFNI conducting a feasibility study in respect of the possible production locally of a high protein processed food or foods, especially in relation to young child feeding, will have completed their task by the time this issue of Cajanus is despatched. They will have visited by the end of their assignment most of the English-speaking countries of the area.

Preparations are well in hand to complete the final processing of the data from the Barbados National Nutrition Survey. It is hoped to be able to present the draft version of the report to the governments early next year.

The annual meeting of the Policy Committee took place on October 14 and 15. This committee is, so to speak, CFNI's "governing body", on which all the governments and agencies who contribute to CFNI's main budget are represented, viz., the Governments of Jamaica and Trinidad and Tobago, the U.W.I., PAHO/WHO, FAO and the Research Corporation of New York. There were fruitful discussions both on the 1969-70 programme and on the long-term future of the Institute.

On November 24 the staff of the Jamaica Centre were pleased to be able to welcome Dr. A. Horwitz, Director of PAHO, who along with Dr. A. Gerald, Chief of PAHO Zone I, visited the Institute, met the staff and held discussions with the Director.

Recruitment for the "Population Nutrition Unit" of CFNI financed by the Rockefeller Foundation is actively underway, and we expect to be able to welcome sonn at least one, and hopefully more, of the three technical staff members who will be attached to this Unit.

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CAJANOQUOTE: *"A new high-protein soybean variety has been developed at the Agricultural Experiment Station at Purdue University. The average protein of the new variety is about 43% compared with 39% for Amsoy and 40.5% for Harosoy 63 and Beeson varieties. The new variety, Protana, is recommended for use in specialized markets and may be valuable in expansion of markets where soybeans are used as a human food source. Protana is the fourth new soybean variety produced at Purdue this year. It is phytophthora root rot resistant. Foundation seed of Protana is being produced this year and will be released as a special purpose variety." From 'Cereal Science Today', October 1969.*

BOOK REVIEW

PROTEIN FOODS FOR THE CARIBBEAN. Proceedings of a Conference held in Georgetown, Guyana, July 1968, edd. J.I. McKigney & R. Cook, pages vi + 121, published by Caribbean Food & Nutrition Institute, Kingston, Jamaica, distributed by Bolivar Press, P.O. Box 413, Kingston 10, Jamaica, price U.S. $6.00 or Two Pounds Ten Shillings (J.$5.00).

It is not often that the proceedings of a conference are as attractively and fully presented as in this report. The reader will be taken on a guided tour not only of the scientific considerations involved in the approach to and development of protein food mixtures, but also of the many and varied efforts already being made by West Indians to solve this pressing problem in their own countries. However, of more importance is the appreciation which can be gained of the complexity of the maze of economic, socio-cultural, agricultural and governmental policies for which no foolproof guide or map can be supplied but which must nevertheless be successfully traversed in order to reach the desired end.

Some of the more technical papers may be difficult reading for the uninitiated and recommendations made in individual papers may not be suitable for every country. but there is an excellent summary of the conclusions at the end of the book. This opportunity is taken to draw special attention to sections III, VII and IX of this summary, (but to raise some objection to the suggestion, made in the last mentioned section at (IV) that dried skim milk is the *single* cheapest supply of animal protein - what about salted codfish!?)

It is hoped that policy makers in economic, agricultural, health and educational planning will take the time to peruse this very useful publication.

Miss Helen Fox
Ministry of Health
Jamaica.

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